REPORT RESUMES

ED 012 340 VT 002 930

COMPILATION OF TECHNICAL EDUCATION INSTRUCTIONAL MATERIALS.
SUPPLEMENT I, NEW AND REVISED INFORMATIONAL RESOURCES.
BY- COTRELL, C.J. VALENTINE, I.E.
OHIO STATE UNIV., COLUMBUS, CENTER FOR VOC. EDUC.
PUB DATE APR 67
EDRS PRICE MF-$0.27 HC-$7.40 185P.

DESCRIPTORS- *RESOURCE MATERIALS, INSTITUTES (TRAINING PROGRAMS), *LEADERSHIP TRAINING, *TECHNICAL EDUCATION, ADMINISTRATIVE ORGANIZATION, PROGRAM EVALUATION, EVALUATION METHODS, EDUCATIONAL FACILITIES, EDUCATIONAL FINANCE, GUIDELINES, BIBLIOGRAPHIES, *INSTRUCTIONAL MATERIALS, COLUMBUS

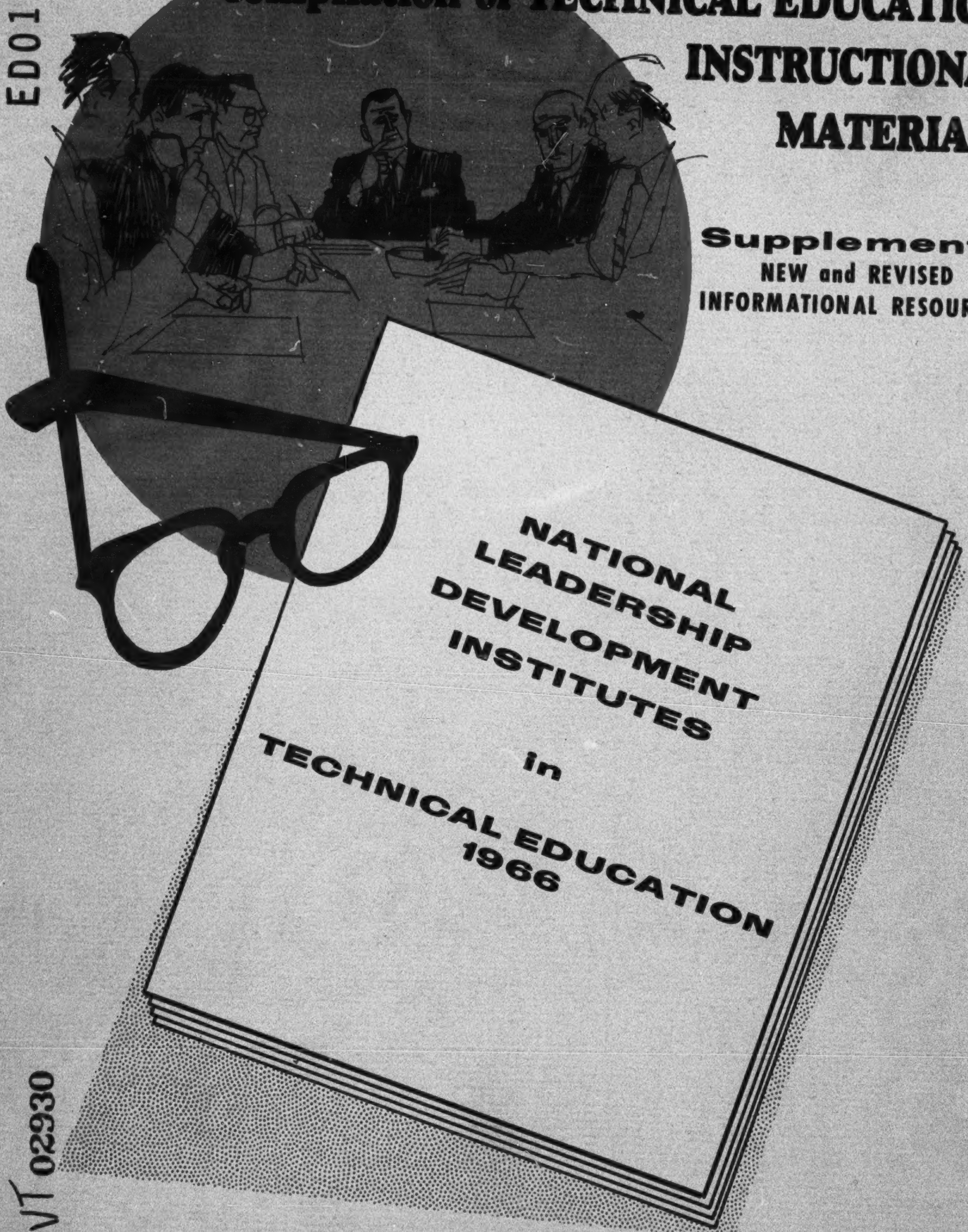
ADDITIONAL MATERIALS WERE DEVELOPED TO SUPPLEMENT "COMPILATION OF TECHNICAL EDUCATION MATERIALS" (VT 002 936) ON RECOMMENDATION OF THE PROJECT EVALUATION COMMITTEE FOR THE NATIONAL LEADERSHIP DEVELOPMENT INSTITUTES IN TECHNICAL EDUCATION. FOUR PAPERS WERE COMMISSIONED BY THE CENTER FOR VOCATIONAL AND TECHNICAL EDUCATION. "ADMINISTRATIVE PATTERNS IN TECHNICAL EDUCATION" DESCRIBES AND COMPARES STATE AND INSTITUTIONAL PATTERNS, PROJECTS FUTURE TRENDS, MAKES RECOMMENDATIONS FOR PLANNING AND DEVELOPING ADMINISTRATIVE STRUCTURES, AND INCLUDES AN APPENDIX OF STATE AND LOCAL ORGANIZATIONAL STRUCTURES. "THE EVALUATION OF TECHNICAL EDUCATION PROGRAMS" PRESENTS GUIDELINES FOR DEVELOPING EVALUATIVE CRITERIA AND SELF-EVALUATION INSTRUMENTS, AND PROVIDES EVALUATION CHECKLISTS FOR EACH PHASE OF OPERATION. "FACILITIES PLANNING FOR TECHNICAL PROGRAMS" PRESENTS THE PROCEDURES, RESPONSIBILITIES, GUIDELINES, AND CRITERIA FOR PLANNING AND CONSTRUCTING FACILITIES. "FINANCING PROGRAMS OF TECHNICAL EDUCATION" DEVELOPS PRINCIPLES, METHODS, AND SOURCES OF FINANCING. A BIBLIOGRAPHY AND SUPPLEMENTARY MATERIALS ARE INCLUDED. THERE IS A SECOND SUPPLEMENT (VT 002 938). (HC)

ED012340

Compilation of TECHNICAL EDUCATION INSTRUCTIONAL MATERIALS

Supplement I

NEW and REVISED
INFORMATIONAL RESOURCES



NATIONAL
LEADERSHIP
DEVELOPMENT
INSTITUTES
in
TECHNICAL EDUCATION
1966

VT 02930

THE CENTER FOR VOCATIONAL AND TECHNICAL EDUCATION / THE OHIO STATE UNIVERSITY
980 KINNEAR ROAD / COLUMBUS, OHIO 43212

The Center for Vocational and Technical Education has been established as an independent unit on The Ohio State University campus with a grant from the Division of Adult and Vocational Research, U. S. Office of Education. It serves a catalytic role in establishing a consortium to focus on relevant problems in vocational and technical education. The Center is comprehensive in its commitment and responsibility, multidisciplinary in its approach, and interinstitutional in its program.

The major objectives of The Center follow:

1. To provide continuing reappraisal of the role and function of vocational and technical education in our democratic society;

2. To stimulate and strengthen state, regional, and national programs of applied research and development directed toward the solution of pressing problems in vocational and technical education;

3. To encourage the development of research to improve vocational and technical education in institutions of higher education and other appropriate settings;

4. To conduct research studies directed toward the development of new knowledge and new applications of existing knowledge in vocational and technical education;

5. To upgrade vocational education leadership (state supervisors, teacher educators, research specialists, and others) through an advanced study and in-service education program;

6. To provide a national information retrieval, storage, and dissemination system for vocational and technical education linked with the Educational Research Information Center located in the U. S. Office of Education;

7. To provide educational opportunities for individuals contemplating foreign assignments and for leaders from other countries responsible for leadership in vocational and technical education.

COMPILATION OF TECHNICAL EDUCATION INSTRUCTIONAL MATERIALS

SUPPLEMENT I
NEW AND REVISED INFORMATIONAL RESOURCES

NATIONAL LEADERSHIP DEVELOPMENT INSTITUTES
in
TECHNICAL EDUCATION

SUMMER 1966

Compiled by

C. J. Cotrell
and
I. E. Valentine

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

THE CENTER FOR RESEARCH AND LEADERSHIP
DEVELOPMENT IN VOCATIONAL AND
TECHNICAL EDUCATION

The Ohio State University
Columbus, Ohio 43212

April 1967

The Work Presented Or Reported Herein Was Performed Pursuant To A Grant From The U. S. Office Of Education, Department Of Health, Education & Welfare.

PREFACE

In the summer of 1966, 195 leaders and potential leaders in technical education, representing 46 states and Puerto Rico, participated in five National Leadership Development Institutes in Technical Education. The institutes were conducted by the following institutions and directors to whom we are very grateful: Colorado State University, H. L. Benson; Oklahoma State University, Maurice W. Roney; Rutgers - The State University, Milton E. Larson; The University of Florida, E. L. Kurth; and The University of Illinois, M. Ray Karnes. The national consortium of five cooperating institutions was coordinated by The Center for Vocational and Technical Education, The Ohio State University.

The coordinating institution prepared several types of materials for use as instructional resources in the institutes. An original Compilation of Technical Education Materials was prepared in April 1966. Experience in the institutes and the project evaluation, however, revealed the need for additional instructional materials for use by the participants and institute staff for conducting future state and locally sponsored leadership training. To fulfill this requirement, the compilers have developed and incorporated new and revised instructional materials in supplements to the original compilation.

Supplement I contains a compilation of papers on administration, evaluation, finance, and facilities for technical education; a technical education bibliography; and new and revised instructional resources.

Recognition is due for the following staff members who prepared this document: Calvin J. Cotrell, Specialist and Director of the Project; Ivan E. Valentine, Consultant and Coordinator of the Project; David L. Larimore, Research Associate; and Betty Diehl, Secretary, The Center for Vocational and Technical Education. Others who merit recognition are the authors of the four papers, Dr. Joseph T. Nerden, North Carolina State University; Mr. Lucian Lombardi, Chief, Bureau of Technical Institutes, State of Connecticut; Dr. Lynn A. Emerson, Technical Education Consultant; and Dr. Milton E. Larson, Colorado State University.

The reviewers of this supplement were Drs. A. J. Miller and Harry Huffman, Specialists, The Center for Vocational and Technical Education, The Ohio State University, and Dr. Franklin Keller, Consultant, Vocational and Technical Education.

Robert E. Taylor
Director

TABLE OF CONTENTS

Page

Preface iii

Introduction vii

PART I - Administration

Administrative Patterns in Technical Education - Lynn A. Emerson 3

PART II - Evaluation

The Evaluation of Technical Education Programs - Lucian Lombardi and Carmelo Greco 53

PART III - Facilities

Facilities Planning for Technical Education Programs - Milton E. Larson 109

PART IV - Finance

Financing Programs of Technical Education - Joseph T. Nerden . . . 149

PART V - Bibliography

A Bibliography on Technical Education - David L. Larimore 171

PART VI - Revised Materials

Revised Informational Resources - Ivan E. Valentine 187

Secondary Pre-Employment Technical Education Enrollments in Title III Programs in the United States - Fiscal Year 1965 . . . 189

Post-Secondary Pre-Employment Technical Education Enrollments in Title III Programs in the United States - Fiscal Year 1965 191

Percent of Growth for Technical Education by Kind of Institution by Year from 1959 Through 1964 193

Actual and Projected Enrollments and Percentages for Vocational and Technical Education 195

Total State Enrollments in Title III Technical Education Programs for 1963 and 1965 197

INTRODUCTION

The materials contained in this publication are current, timely, applicable broadly, and should be of great value to state and local leaders in Technical Education. No comparable information is available elsewhere under a single cover.

Supplement I contains new and revised informational resources which have been recommended by the project evaluation committee as part of the additional instructional materials effort of the coordinating institution. The compilation has been divided into six parts.

Parts I through IV consist of four papers which The Center for Vocational and Technical Education commissioned. These papers are presented in alphabetical sequence by author as follows:

Administrative Patterns in Technical Education
Lynn A. Emerson

Facilities Planning for Technical Education Programs
Milton E. Larson

Evaluation Procedures for Technical Education Programs
Lucian Lombardi
Carmelo Greco

Financial Patterns in Technical Education Programs
Joseph T. Nerden

Part V contains a bibliography on Technical Education prepared by David L. Larimore which is a synthesis of bibliographies contributed by Drs. Lynn A. Emerson, Maurice Roney, E. L. Kurth, and Milton E. Larson.

Part VI is composed of materials selected and/or prepared by Ivan E. Valentine which supplement and revise information in the original Compilation of Technical Education Materials pertaining to technician employment, Technical Education enrollments, and projected facilities requirements for Technical Education.

The compilers trust that this publication will be beneficial to future leadership development programs in Technical Education.

C. J. Cotrell
and
I. E. Valentine

PART I

ADMINISTRATION

ADMINISTRATIVE PATTERNS IN TECHNICAL EDUCATION

by

Lynn A. Emerson*

Great diversity is noted in the types of institutional patterns utilized to provide technician education and in the organizational structures developed in the several states to supervise and administer the programs. In some states, the major portion of this type of education is provided through post-high school institutions. In other states, the high school carries a portion of the total load. In 1963, some 20,000 persons were enrolled in pre-employment technical education programs on the high school level as compared with some 56,000 on the post-high school level.

Great variety is found in the state organizational structures. California has a large share of the total program in its community junior colleges with a small amount in comprehensive high schools. Wisconsin has its programs in the adult and vocational-technical schools. New York has been utilizing its federal funds for technician education in schools of secondary level--comprehensive high schools, technical high schools, area vocational-technical schools--although the state has extensive technician training in its post-secondary technical institutes and community junior colleges. New Jersey subsidizes programs of secondary and post-secondary type in its county vocational-technical schools and technical institutes. The Texas program is largely in the community colleges. North Dakota concentrates most of its program in a single State School of Science, a comprehensive post-high school institution. Connecticut has technical institutes and some additional programs in its vocational-technical schools. Florida spreads its program among community colleges, area vocational schools, and high schools. Kentucky's program is almost entirely in its system of area vocational-technical schools, as is the case with Georgia. North Carolina provides most of its technician education in post-secondary schools--industrial education centers, technical institutes, and community colleges. Massachusetts has designated its former vocational schools as area vocational schools and provides most of its technician training in these schools on the secondary level with a few programs of post-high school level. The District of Columbia has one curriculum on the post-high school level in each of two vocational high schools. Some types of state administration patterns for vocational-technical education are described in the following paragraphs.

New York.--Under the Regents which have overall control of education in the state are the State Education Department which supervises the local secondary school program and the State University of New York which deals with higher education including the community junior colleges and the state agricultural and technical institutes. The state director of vocational education is located in the State Education Department, and the work of his office is confined to the secondary school program except for some allocation of federal funds to the community college program. The technical education program subsidized from federal funds has largely been in the high schools and area schools (BOCES).

---

*Dr. Emerson is Professor Emeritus, Cornell University, and Consultant in Technical Education.

Virginia.--Programs in the high schools are under the State Board of Education. Programs in the area schools, formerly under the State Department of Education, are now under the newly developed Department of Community Colleges which recently emerged from the State Department of Technical Education. The organization chart for the State Department of Community Colleges, which has its own board separate from other state boards, includes a director, deputy director, associate director for research and development, associate director for administration and finance, associate director for instructional programs, associate director for student affairs and services, and associate director for special training programs. The department also includes a number of assistant directors for various types of services.

In this country as a whole are a number of differing patterns of state administration for dealing with technical education. Among these are the following:

Connecticut.--A state-operated and state-supported program under the State Department of Education, including vocational-technical area schools and technical institutes.

Virginia.--A state-operated technical program under a separate board of community colleges and a state board of education which supervises vocational-technical education in the high schools. The state director of vocational education is in the State Department of Education.

New Jersey.--A single state board of education which deals with high schools and community colleges, with very new legislation separating the community colleges from the state board of education and placing them under a board for higher education which includes other higher education institutions.

Wisconsin.--A separate state board for vocational and adult education with local boards for vocational education with a program including technical institute curriculums.

Massachusetts.--Separate state board for regional community colleges and a state board of education that supervises some post-high school technical programs as well as vocational-technical education in the high schools.

Maryland.--Mixed patterns, such as Maryland, in which the public school vocational-technical education programs are supervised by the office of the state director of vocational education, and the community college technical programs are under the supervision of the division of accreditation.

The foregoing listing of programs within the selected states comes from the report of the U. S. Office of Education in February 1965. Changes are taking place, and the pattern of tomorrow may be somewhat different from that of today. But this portrayal gives a reasonably accurate picture of the situation in the United States as it exists today.

Technical Training in the Technical Institute

The institution most directly related to the training of technicians is the technical institute. It has been concerned with this field of training for many years and is particularly identified with the training of engineering technicians. In the early years, the most prominent schools of this type were private institutions with programs devoted wholly or largely to technician training. With the expansion of this type of education, new institutional patterns emerged with technician training provided in a technical institute division of a larger institution. The term "technical institute type" has come into general usage to denote training programs similar to those offered in technical institutes, and these are found today as units of vocational-technical schools, community colleges, engineering colleges, and universities.

The administrative pattern within the technical institute, or within the technical institute division of a larger institution, if the school is of sufficient size, often includes a president or director, one or more assistant directors (one of whom may have responsibility for the evening program), a director of admissions, a dean of students, and other ancillary personnel. Some typical administrative patterns are outlined in the following pages.

Mohawk Valley Technical Institute in Utica, New York, is sponsored by the County of Oneida and is under the supervision of the State University of New York. Its board of trustees has nine members, four appointed by the Governor, five by the county board of supervisors. In 1963, the Institute had an enrollment of some 900 full-time students and a total enrollment of over 2,500 including the evening program. The faculty numbered 42 persons, including seven department heads. The program includes curriculums in such fields as real estate and retail business management, as well as mechanical and electrical technology. The administrative staff includes a president, a dean of instruction, a director of admissions, a director and assistant director of evening and extension programs, a dean of students, an associate dean of student personnel services, and a coordinator of the cooperative work program.

Wentworth Institute, a large private technical institute in Boston, with a wide array of curriculums in engineering technology and industrial technology, had a full-time enrollment in October 1962 of 1894 full-time students and a total enrollment of more than 3200. The Institute operates under a board of trustees of 16 members. In 1963, the day school faculty numbered 139, including 20 department heads. The administrative staff is larger than that found in many institutions and includes a president, an assistant, two deans of instruction, and two assistant deans of instruction, a dean of students and assistant dean, a dean of admissions and assistant, a director of placement and assistant, a bursar and assistant, a registrar, a scholarship and loan counselor, three admissions counselors, and a dormitory manager.

Southern Technical Institute, Marietta, Georgia, is a unit of the Engineering Extension Division of Georgia Institute of Technology. The enrollment in October 1962 was 952 full-time students. The Institute is under the general supervision of the Director of the Engineering Extension Division. The administrative staff at Marietta includes a director, registrar, dean of the basic studies division, dean of the technical division, dean of students, and an interviewer-counselor. The faculty consisted of 50 members in 1963, including 10 department heads.

Del Mar Technical Institute, Corpus Christi, Texas, is a branch of Del Mar College, located on its own campus. The College is a two-year institution operated under the direction of a board of trustees of nine members elected by the voters of the district. In October 1962 the College, as a whole, had an enrollment of 1346 full-time students and a total enrollment of 2559. The administrative staff of the College includes a president, dean of the college, dean of the technical institute, director of engineering technology and vocational trade education, registrar and director of admissions, treasurer, supervisor of vocational nursing, supervisor of the institute of retailing, supervisor of T & I extension, and assistant supervisor of trade preparatory education. The Technical Institute has 13 instructors in engineering technology.

New York State Agricultural and Technical Institute at Farmingdale is a unit of the State University of New York, financed by the state, and under the general supervision of the Executive Dean for Institutes and Community Colleges. The Institute has a local Council of eight members. The full-time enrollment in October 1962 was 1755 students; the total enrollment was 5582 students. The Institute is administered by a president and assistant, a dean and assistant, a dean of students and associate, director of admissions, counselor, assistant dean of the evening and extension division, director of residence halls, and public information officer. The faculty includes 129 members of which 15 are department chairmen.

Technical Institutes of Oklahoma State University, at Stillwater and Oklahoma City, are units of the College of Engineering. The University has its board of regents of nine members, and the various higher education institutions of the state are coordinated by the Oklahoma State Regents for Higher Education with its board of nine members. The Technical Institute at Stillwater has a director, an assistant director, and 24 additional faculty members. The Institute at Oklahoma City has a director, an assistant director, and 14 faculty members.

School of Technology, Purdue University, with campuses at Lafayette, Calumet, Fort Wayne, Indianapolis, and Michigan City, Indiana, includes the Division of Applied Technology and the Department of Industrial Education. It administers the two-year associate degree programs in the Division of Applied Technology, the new continuing curriculum leading to the baccalaureate in technology, and the curriculum leading to the B. S. in Industrial Education. The administrative staff includes a dean of the School of Technology, an assistant dean of the school and director of the Division of Applied Technology, assistant director of the Division of Applied Technology, director of the Office of Manpower Studies, director of counseling services, director of admissions, registrar, and department heads of industrial education, nursing, aviation technology, electrical engineering technology, and mechanical engineering technology. The faculty at the five centers numbers 134 persons.

Technical Training in the Community Colleges

The present-day community college had its origin in the junior college which in the early years was restricted to lower division or transfer type programs. The junior college developed from two directions--upward from the high school, and downward from the university. The program of the present-day community college usually covers a wide scope--transfer curriculums of liberal arts or pre-professional type; semi-professional level curriculums designed to prepare youth for effective entry into work life; technical curriculums in the industrial, health, and other fields; business curriculums of various levels; skilled occupations curriculums; and adult and general education programs. The curriculums usually are two years in length, although shorter courses often are available. The two-year curriculums usually lead to the associate degree. The expansion of occupational education programs in the community colleges, under the federal vocational acts, has been held back somewhat by the "less than college grade" clause in the Smith-Hughes and George-Barden Acts even though the Office of Education rulings permit subsidy for vocational education programs that do not lead to the baccalaureate degree. The Vocational Education Act of 1963 removed this clause and made it possible for states to transfer funds from the Smith-Hughes and George-Barden appropriations to the 1963 Act, which has fewer restrictions.

Technician education in the community college is found in a wide range of occupational fields--industry, health, agriculture, public service, business, and others. Technological development continues to increase the range of curriculum offerings leading to such programs as radiation technology, instrumentation technology, electro-mechanical technology, and very rapid growth in electronic data processing. The proportion of the total community college program that is devoted to technical education differs widely. In some institutions which have emerged from technical schools, such as some of the New York State community junior colleges, the relative amount of technical education is much higher than in colleges that developed through the junior college transfer-program pattern. The administrative pattern and the qualifications of the personnel with respect to understanding of and competence in technical education also differ widely.

The administrative staff of the community college has to deal with all phases of community college activity, and generally a small proportion of the total effort is devoted to the problems of technical education. Sometimes the specialized technical personnel is limited to members of the instructional staff. Where the programs are of substantial size, department heads or chairmen are designated, or a dean or director may head the whole technical program. In some cases, there is a director for each major unit such as engineering technology, health technology, and business technology. Some typical administrative patterns follow:

New York City Community College is one of the institutions that emerged from the initially state-supported institutes of applied arts and sciences established on a temporary basis by the State of New York. It is a unit of State University of New York, locally sponsored, with its local board of seven trustees. Its full-time enrollment in 1965 numbered some 2800 students, and its part-time enrollment more than 6000. The administrative staff includes a president, dean of the college, dean of administration, dean of students, director of evening and extension division, finance officer, bursar, registrar, director of admissions, director of guidance, director of athletics, and numerous administrative assistants. The College has a head of the division of technology, and in the College as a whole, there are 16 department chairmen. In 1964-65, the full-time faculty had 267 members, the part-time faculty, 348 persons.

North Dakota State School of Science, Wahpeton, is a state-operated institution of community college type with a junior college (transfer programs), a business school, and a trade-technical school. The latter includes some half dozen technical curriculums for the training of technicians. The State of North Dakota has concentrated its trade and technical training in the one institution which enrolls students from all parts of the state. It is under the direct control of the State Board of Higher Education consisting of seven members and the commissioner. The State School of Science has a president, registrar and director of the business school, director of the trade-technical school, director of the junior college, business manager, dean of men, dean of women, director of placement and evening school, and numerous assistants. The full-time faculty approximates 80 members. Enrollment in 1964-65 was some 1800 full-time students.

Harford Junior College, Bel Air, Maryland, operates as a part of the Harford County educational program with its own board of trustees of seven members and a secretary-treasurer. The college's organizational chart appears on Page 21 of the Appendix. The faculty of the college, as a whole, numbers 57 persons. In the fall of 1964, the full-time enrollment was 323 students and the total enrollment 705. The college has recently occupied a new technical building.

Foothill College, Los Altos Hills, California, is one of the newer California community colleges that has grown rapidly. It offers 20 occupational curriculums of technical and semi-professional level in addition to a wide range of transfer curriculums. In October 1964, the full-time enrollment was 4118 students, the part-time enrollment, 4615. In 1964-65, the faculty included 261 full-time persons and 217 who taught on a part-time basis. The Foothill College District serves the Palo Alto, Mountain View, Los Altos, and Fremont high school districts in northern Santa Clara County. The College operates under a board of trustees of five members. The administrative staff includes a president, dean of instruction, dean of students, business manager, director of technical education, director of evening college and summer session, director of community services, director of library services, director of student activities, director of guidance, director of athletics, college psychologist, college physician, foreign student advisor, placement officer, 11 counselors, 9 division chairmen, and many assistants in the various administrative categories. As an institution grows in size, and in the spread of its curriculum offerings, the administrative structure grows accordingly. Foothill College thus has a much more complex administrative pattern than most of the smaller schools.

North Carolina Community Colleges.--The administrative pattern of the community colleges, industrial education centers, and technical institutes in North Carolina follow the general pattern shown on Page 23. The organization chart shown is that of the community college. In the chart for the technical institute and the industrial education center, the director of academic programs is omitted.

Chicago City Junior College, with its eight campuses, offers a wide range of occupational curriculums as well as the transfer program. The organization chart for the city and a branch are combined in the chart on Page 25. A schematic diagram of faculty participation in policy formulation is shown on Page 27.

Administrative Patterns of Technical Education at the Secondary Level

Although the general trend is toward post-high school technical training, there are still many high school technical programs. New York, for instance, does a lot of its technical training at the high school level as do other states. These programs take several forms. For the technical department of a comprehensive high school, such as North High in Binghamton, New York, the technical program is usually under a single head such as a director of vocational education. For large technical high schools, such as Brooklyn Tech, under the principal and his assistants are department heads for the several major technologies. In the vocational-technical high school, such as Saunders in Yonkers, the size does not warrant separate department heads, and the direct administration is handled from the office of the principal.

Another very common type of secondary technical training takes place in the area vocational schools. A good example of an area vocational school is Penta-County, located near Toledo, Ohio. This school district is made up of 19 other school districts from five counties. It is a vocational school, a two-year technical college which gives transfer credit for continuation toward an engineering degree, as well as an adult education center. All juniors and seniors from the member schools are eligible to attend. No student is graduated from Penta-County Vocational High School. The students receive their diplomas from their home schools. The home schools also supply the extra-curricular programs for these students. The school presently has 104 teachers and 1100 students. The organizational structure of Penta-County is on Page 29.

Administrative Patterns for Area-Vocational-Technical Schools

Most area vocational-technical schools, unlike Penta-County, deal mainly with post-high school technical education and high school dropouts. The main difference here is whether the institution views itself as offering a post-high school program, a high school program, or as in the case of Penta-County, a combination of the two. Examples of the administrative structures of post-high school vocational-technical schools are Emily Griffith Opportunity School, Denver, Colorado, and Wausau Technical Institute, Wausau, Wisconsin. Both of these schools offer technical as well as vocational programs.

Wausau Technical Institute has a director, and under him are three assistants--one in charge of business operations, one for student personnel services, and one in charge of instruction. Under the assistant in charge of instruction come the different area coordinators for home economics, distributive education, business education, agriculture education, and trade and industrial education. These coordinators are then responsible for the coordination of the schools' 44 instructors.

The organizational chart for the Emily Griffith Opportunity School of Denver, Colorado, can be seen on Page 31. Also, see the organizational

Chart on Page 33, which is an example from North Carolina of an area vocational school under the directorship of a board of trustees.

Future Administrative Patterns for Technical Education

Trends That Have Bearing on Technical Education

Any discussion of trends must take into account the past, the present and the projected future. Most projections carry with them the possibility of error, for predictions must be based upon the past and events sometimes turn in quite a different direction from that followed in the past. But one must take this chance in making predictions. In this discussion, it is assumed that demographic, technological, labor market, educational, and economic aspects of society in the years immediately ahead will follow the same general pattern of change that has taken place since 1950. Major scientific breakthroughs or other changes of great magnitude will alter the projected patterns.

Technological change in the past 15 years has started unprecedented developments in many aspects of life, and its full impact lies ahead. Cybernetics--a combination of automation and computers--is having profound effect. Automation, which may be defined as the automatic production of material products, has freed man's muscle of routine operations. Computers, sophisticated analyzers and interpreters of complex data, have freed man's mind of routine thinking. It has been predicted that the computer may have a more beneficial potential for the human race than any other invention in history. Development of the transistor and laser, satellites in orbit and spacecraft on the moon, planes just under the speed of sound, and computers routing long distance telephone calls, navigating satellites, diagnosing human ailments, and achieving scores of other uses--these are a few of the developments of the type that will change our lives drastically in the years ahead. These technological changes demand new technical skills. Increasingly the public technical education programs are being called upon to supply the trained personnel.

Changes are taking place within the labor force. Engineers are moving upward into work of more highly scientific nature, leaving an applied technology gap to be filled by the technician. The technical content of a great many types of jobs is increasing; some that formerly were classed as skilled crafts now begin to take on the aspects of the work of the technician. Unemployment among youth of the 18 to 20-year age group is much higher than for older workers, with the implication and suggestion that many of them be kept out of the labor market and given additional education during these years. Many new occupations are emerging, growing out of the new technological developments, as for example, in the data processing field. Many of these new occupations fit into the province of the technical institute type of program.

Demographic changes of interstate migration, migration from cities to suburbs, commuting patterns, relocation of industries, population growth, and the like have bearing on technician education. The mobility of technicians and the widening of the labor market into which graduates of a technical institute type of program can go have their effect on educational patterns.

Profound changes are taking place in the field of occupational education. The Vocational Education Act of 1963 removed some shackles that have held many types of occupational education in outmoded traditional paths. States and local communities are now in position to utilize federal funds much more effectively, and technical education should profit from this change. The age and grade level at which occupational education is provided appear to be steadily rising. Fifty years ago, it was common to take a boy who had completed the 6th grade, give him two years of intensive training, and place him as an advanced apprentice. Over the years, the grade level for such training has advanced; today much of it is in the post-high school level, and there seems to be some effort toward reorganizing the curriculums of the high school to provide a pretechnical sequence of science, applied technology, mathematics, and drawing which would prepare the student for effective entrance into the technical institute type of program in the post-high school institution.

Considerable increase is noted in the numbers of students who are enrolled in technician curriculums and in the increased number and range of curriculum offerings. Area vocational-technical schools are being built rapidly in many states, stimulated by the availability of federal funds. Legislation provisions tend to favor the development of programs of the post-high school level as some institutions are eligible for subsidy from the higher education acts. Many of these area schools are originally built to provide occupational education for high school youth as well as for out-of-school youth and adults, with an area school providing such education for several high schools within commuting distance. It is worthy of note that a considerable number of such schools which originally served high school youth have abandoned that practice in favor of serving out-of-school youth and adults. Furthermore, many of these schools have expanded their programs to include lower division or transfer curriculums and have expanded their service through occupational curriculums of technical nature. Many have also added skilled crafts training. The American Association of Junior Colleges has expanded its services through the addition of specialists in three occupational fields. In a number of states, recent developments have brought about the designation by the legislature of boards of control for community colleges that previously were under a state board of education or were branches of universities. This has raised problems in the distribution of federal funds for vocational education and has placed in the hands of the state director of vocational education the need for coordination of programs under two separate state agencies. Increasing numbers of entrants into technician jobs in the labor market are coming from two-year post-high school institutions, as compared with plant training programs, training on-the-job, etc. This is expected to grow.

Where Changes in Administrative Patterns for Technician Education are Likely to Occur

Changes are taking place in all aspects of technical education. We are likely to see a continuation of change in such phases as the following:

a. Shifting of technical education programs in the high school to the post-high school and adult level. In some states, most of the program is already on the post-high school level, but in others, large numbers of students are enrolled in such programs in the high schools. It is probable that many of the programs of high school level now in area vocational-technical schools will move upward and be offered only to high school graduates and out-of-school youth.

b. Change in the pattern of separate vocational institutions into schools of comprehensive character. The vocational high school will likely become a comprehensive high school and the area vocational school a community college.

c. Rapid development of new community colleges in many states, with increasing recognition of occupational education as a vital part of the total program from the inception of the college. Also, growth in the status of the extended day program of occupational character.

d. Development of master plans on a statewide basis for implementing the orderly development of the total program, expecially on the community college basis. This would go beyond the general forecast included in state plans submitted to the Vocational Division of the U. S. Office of Education.

e. Some additional establishment of state boards for community colleges separate from other state boards.

Organization Patterns for Technician Education Most Likely to be Effective

State administrative patterns, and local patterns in turn, grow out of the overall educational situation in the state, governed by existing legislation, by tradition, and by the effectiveness of the state educational leadership. Once an institutional pattern has been established, it is likely to continue. Sometimes long experience--especially if it is successful--is a doubtful asset in planning future programs, especially if the pattern has been static for some time. The many differences between states--in geography, demography, industrial concentration, wealth, educational tradition--make for differences in the best pattern. What may seem highly desirable for Connecticut may not be at all suitable for North Dakota. The pattern for Florida may well be different from that of Iowa or Colorado. Thus, no specific pattern can be stated as the best one.

The easiest way to develop technicians for industry might well be in a separate technical institute of post-high school type, for mature students, with a wide range of curriculums of occupational type, well equipped laboratories, and a relatively large student body. Such an institution can concentrate on the specific task of technician development, if it is desirable to limit the program to that for engineering technicians. This would provide an effective narrow program, effective for the specific type of student who was fitted for and wanted that type of education. But it would be narrow in program and probably in outlook. In the long run, the type of institution most likely to provide the best education for the greatest number and variety of students and occupations is the community college provided that certain important conditions be met. Such an organization must have a president of vision who accepts occupational education as fully equal to transfer programs in the objective of the college, fully qualified technical staff members, adequate laboratory and library equipment, properly developed curriculums, effective guidance service, an open-door policy toward students, and all-around effective administration. The community college can provide status that is important. It provides breadth of program offerings enabling students to transfer to another curriculum if they find it necessary. It also provides breadth of content in the field of general education. But these are assets only if the occupational curriculums for the training of technicians are carefully designed and properly implemented.

The present-day programs in the high schools, designed to prepare persons for effective entry into technician occupations upon graduation from high school, appear to be more effective in preparing youth for advanced study than for the labor market. Probably a considerable proportion of the students in such technical courses are fully capable of undertaking engineering or scientific training; if so, their contribution to society might well be greater after such advanced study. A recent report on the placement of students from high school technical programs in a large eastern state indicated that some 65 percent of the graduates entered higher educational institutions, a percentage higher than that found among the graduates of the traditional college preparatory program. A recent study of technician manpower by the Bureau of Labor Statistics indicated that the contribution of the high school technical program to the further technical education of the graduate was considerable, but that its contribution to direct entrants into the technician labor market was negligible.

The area vocational-technical school, designed to serve out-of-school youth and adults (and often high school youth as well on a shared-time basis) has been stimulated in its growth by earmarked federal funds. Just what the future is for this institution is uncertain. If community colleges were developed to their full potential and if they would offer a wide spectrum of occupational curriculums of short length as well as two-year sequences, there would probably be no need for the area vocational school, except perhaps as a skill-center for high school youth on a part-time basis. In the long run, the high school will probably alter its entire program to provide a wide range of "tracks" including some for basic occupational education, leaving to the post-high school institution the specialized occupational education. But tradition is powerful, and it will be a long time before all high schools change their programs to gear in with a changing civilization. In a large city with adequate community college facilities in several branches, there may be a place for an adult skill center in which would be concentrated special programs involving extensive equipment, and where a wide range of skill development might be provided through short courses for updating, upgrading, or retraining purposes.

Federal, State, and Local Organizational Structures

The administrative structures of local institutions, whether they be technical institutes, community colleges, area vocational-technical schools, or high schools which offer technical training, are all influenced by the structure of the state organization under which they operate. The states in turn are affected by the administrative structure at the regional and national level.

Different states have adopted administrative structures which they feel best suit their present needs. It is inconceivable that any one administrative structure could be best for all states, if for no other reason than the difference in population. It is hoped, therefore, that states will continue to adopt the administrative structures that best fit their situations, but as situations change, administrative structures need change also. A word of caution needs to be expressed at this point, however. Many states have administrative structures today that are preserved by traditions and an unwillingness to look for and try something better. Do we really believe in change, and if so, does our administrative structure allow for flexibility and change? This question is one that needs to be answered at all levels of administration.

No one can predict or dictate what kind of an administrative structure is best for technical education in a state. Several organizational charts follow to give some insight into how other states are prepared to administer the ever-growing technical education programs. Beginning with the Department of Health, Education, and Welfare, through the Office of Education, and the regional offices, the following pages (35-49) have been presented to give an insight into different organizational patterns which presently exist.

Recommendations

In planning the administrative structure of state and local programs for the education of technicians, certain factors need to be kept in mind and taken into account. Here are some of them:

1. A sufficient number of students per curriculum should be available to warrant hiring an adequate number of staff members. One person should not be required to teach all the technical courses in the curriculum.

2. Consideration needs to be given to the changing patterns of high school curriculum offerings and the impacts of these changes on post-high school patterns.

3. Some potential students will not be able to find the particular curriculum they need and want in the local institution. Such students should be referred to other institutions offering the desired curriculum and adequate housing facilities.

4. Recognition of the breadth of the labor market for technician placement will require utilization of regional or national labor market data as well as those of the local area when programs are planned.

5. Effective programs are based upon applied research. Provision may well be made for appropriate research and development service on a statewide basis when the administrative structure is planned.

6. In statewide planning, the possible desirability of establishing a separate state board for community college administration, such as has taken place recently in several of the states, and the implications of such a move on the statewide administration of the vocational-technical funds may well be considered in states where such programs are under state boards of education.

7. The future place and function of the area vocational-technical school in the total educational pattern may well be taken into account. In what directions will this type of school move in the various states?

The following recommendations concerning the planning and development of the administrative structure for technical education on the state and local level may apply only to specific situations--certain states or certain communities within states. They are presented for consideration.

1. A statewide Master Plan for occupational education, including curricular offerings for the high school and for the post-high school institutions with areas to be served by specific

institutions and curriculums to be offered in these institutions, together with the proposed sequence of development of each new institution, should be developed and kept current.

2. The administration of vocational-technical education at the state level should be sufficiently high up on the organization chart to deal effectively with all occupational education in the statewide system, including the community colleges. This is particularly important when the secondary schools and the community colleges are under separate boards.

3. Steps should be provided for close coordination of all the occupational education programs in the community or the state into a unified whole, including those operated by the Department of Labor, the Office of Economic Opportunity, and others outside the state educational department structures.

4. Effort should be made to develop a sane distribution of federal funds for vocational-technical education among the different agencies concerned with such programs within the state, high school, and post-high school.

5. New programs should be planned in the light of the needs of the youth to be served and the occupational needs of the labor market the program should serve, keeping in mind all agencies and practices that supply workers for the occupational field. Training on-the-job and in formal employer training programs needs to be taken into account.

6. No program should be offered unless it meets the standards of quality that are inherent in adequate staffing of competent personnel, laboratory equipment sufficient in quantity and quality, and a sufficiently large potential student body to make the operation efficient.

7. Provision should be made for designated leadership of qualified persons to administer the technical program at state and local level with realistic standards set for the qualifications of such leaders. These qualifications should insure competent leadership; they may not necessarily mandate a background of technical training on the part of the leader.

8. Programs should provide for adequate numbers of qualified persons to meet the various functions, but this does not mean that the staff should be unduly large. Good judgment is needed with respect to the optimum number of positions that need to be set up in the administration of a new program.

9. In the planning of technical programs, including curriculums and physical plant, care should be taken to avoid practices that may be appropriate for skilled craft training but may not fit the situation for the training of technicians. Experience in planning programs for skilled crafts training under the Smith-Hughes and George-Barden Acts has its value, but care must be taken to avoid pitfalls.

10. The recent federal legislation requires evaluation of programs at stated intervals. In planning programs for technical education, provision may well be made for building such evaluation into the organization structure.

11. The administrative pattern should make provision for adequate entrance interviewing of students and for student counseling, as well as for placement and follow-up of students, on the state level as well as in the individual school.

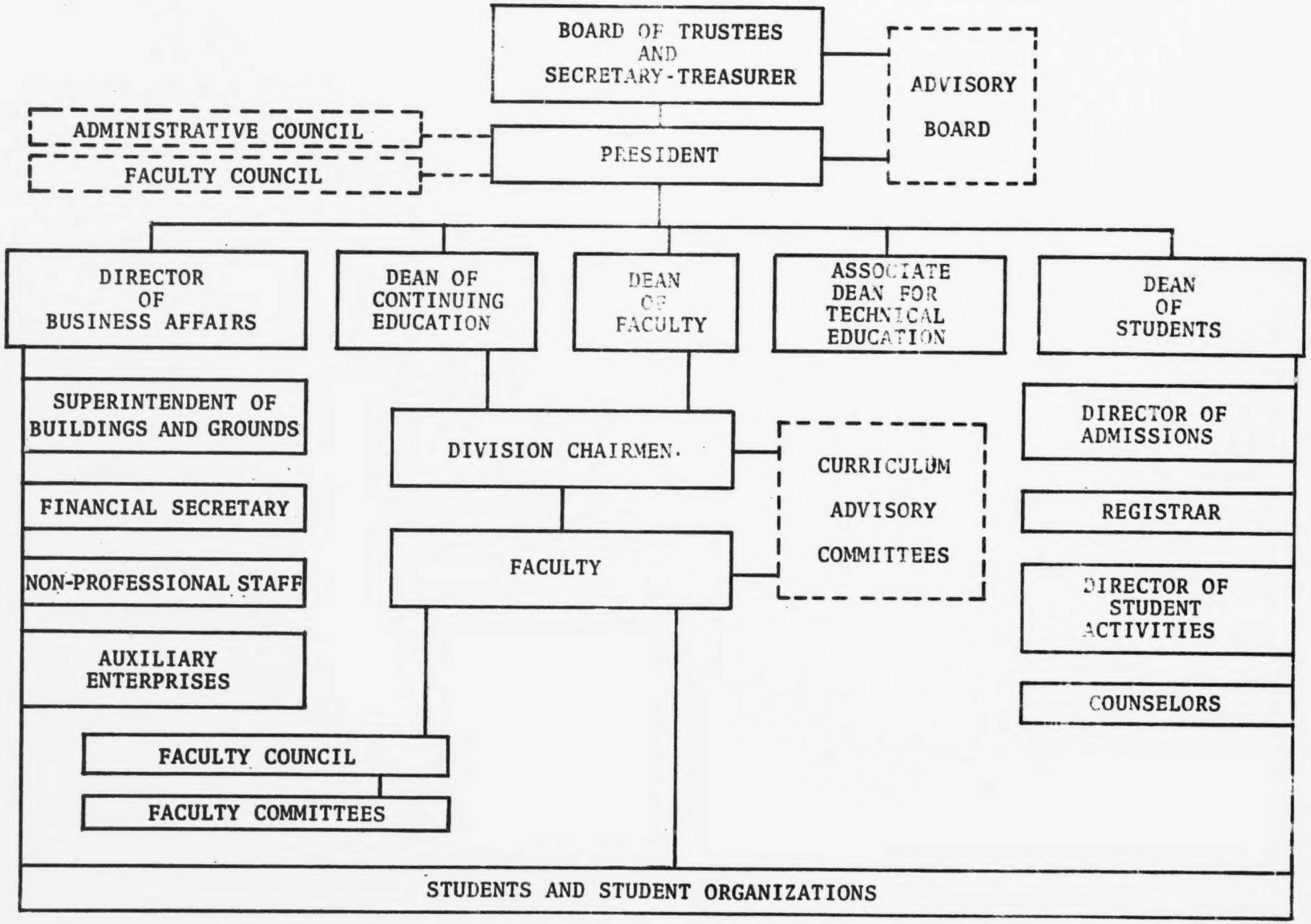
12. Public relations are vital for the success of any technical education program, and provision for these should be made in the organization structure.

13. Throughout the nation many "academic minded" administrators are in charge of institutions in which technical programs are operated. Provision should be made to induce such administrators to become familiar with the aims, procedures, and practices of such programs, and to facilitate their doing so. This is not an easy task, and no specific suggestions are made concerning its implementation.

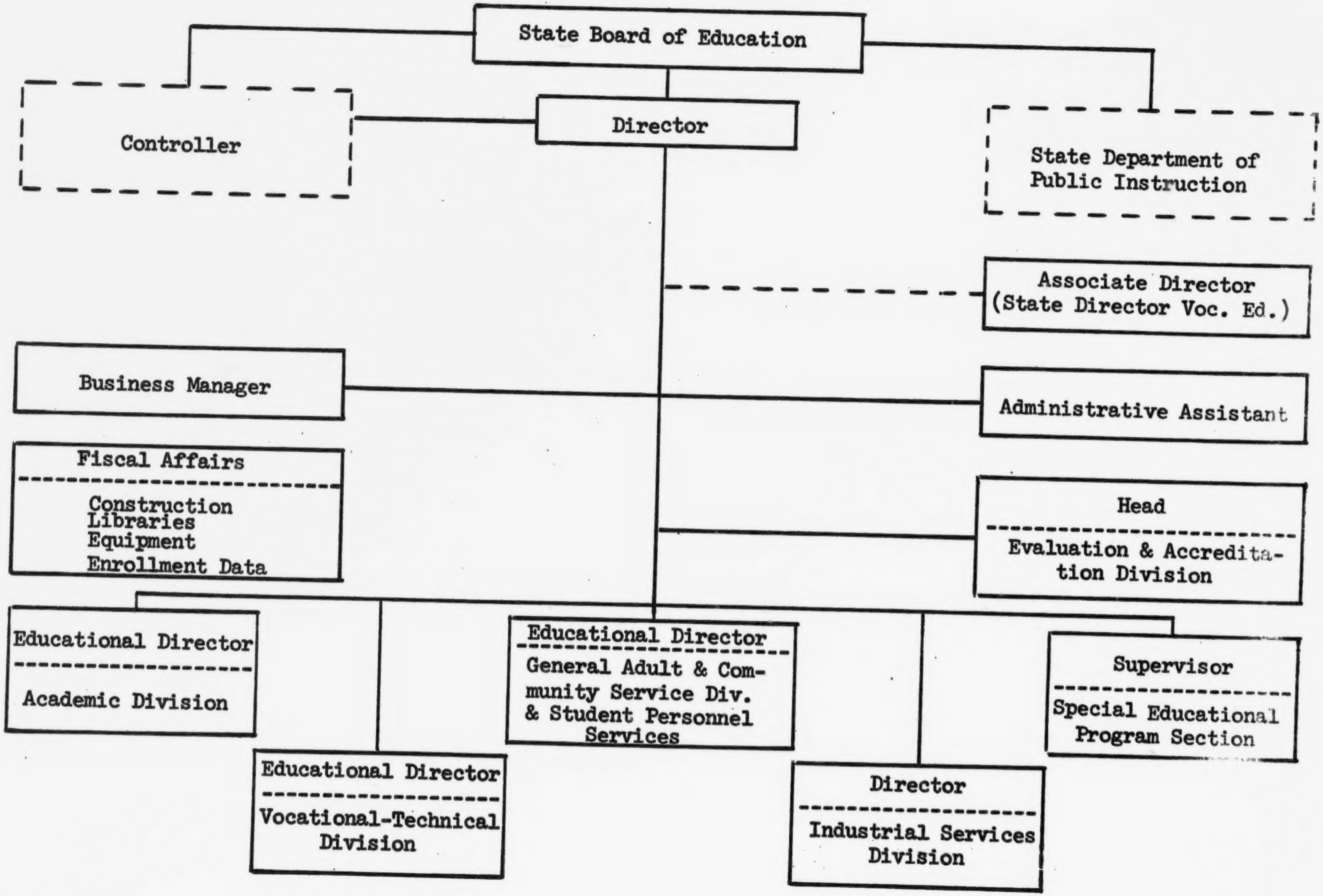
14. Every effort in planning administrative structure for new programs should look well into the future. Physical plant built today will in all probability be in use in the year 2000. Campus acreage needs should be anticipated, since land values rise in the immediate vicinity of a community college. Parking needs of the future may be much larger than for today. Wise planning of the administrative structure as well as of other aspects is highly desirable--a structure that can cope with change.

APPENDIX

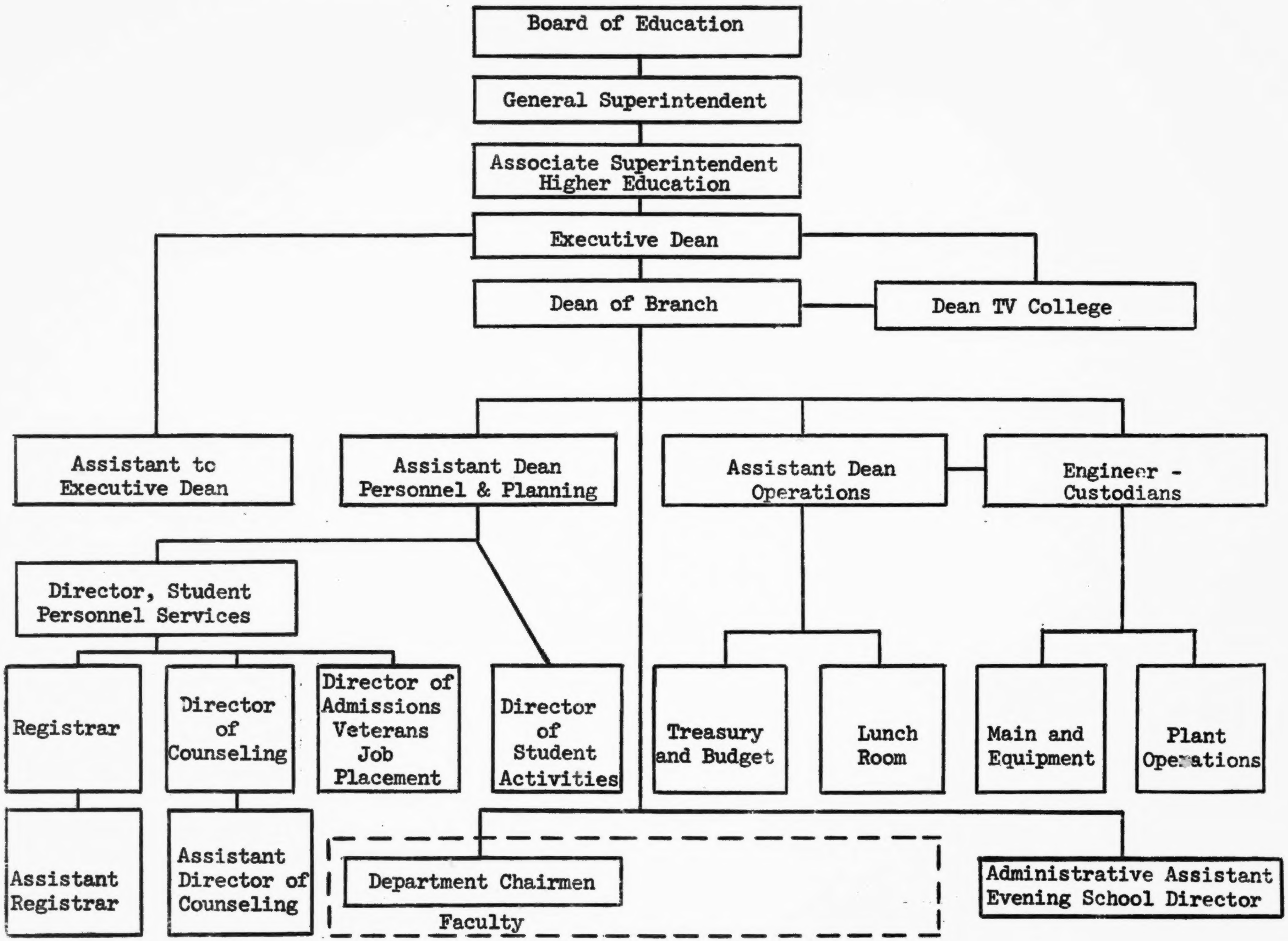
BOARD OF TRUSTEES
HARFORD JUNIOR COLLEGE
BEL AIR, MARYLAND


BOARD OF TRUSTEES AND SECRETARY-TREASURER
ADVISORY BOARD
ADMINISTRATIVE COUNCIL
FACULTY COUNCIL
PRESIDENT
DIRECTOR OF BUSINESS AFFAIRS
DEAN OF CONTINUING EDUCATION
DEAN OF FACULTY
ASSOCIATE DEAN FOR TECHNICAL EDUCATION
DEAN OF STUDENTS
SUPERINTENDENT OF BUILDINGS AND GROUNDS
FINANCIAL SECRETARY
NON-PROFESSIONAL STAFF
AUXILIARY ENTERPRISES
DIVISION CHAIRMEN.
FACULTY
CURRICULUM ADVISORY COMMITTEES
DIRECTOR OF ADMISSIONS
REGISTRAR
DIRECTOR OF STUDENT ACTIVITIES
COUNSELORS
FACULTY COUNCIL
FACULTY COMMITTEES
STUDENTS AND STUDENT ORGANIZATIONS

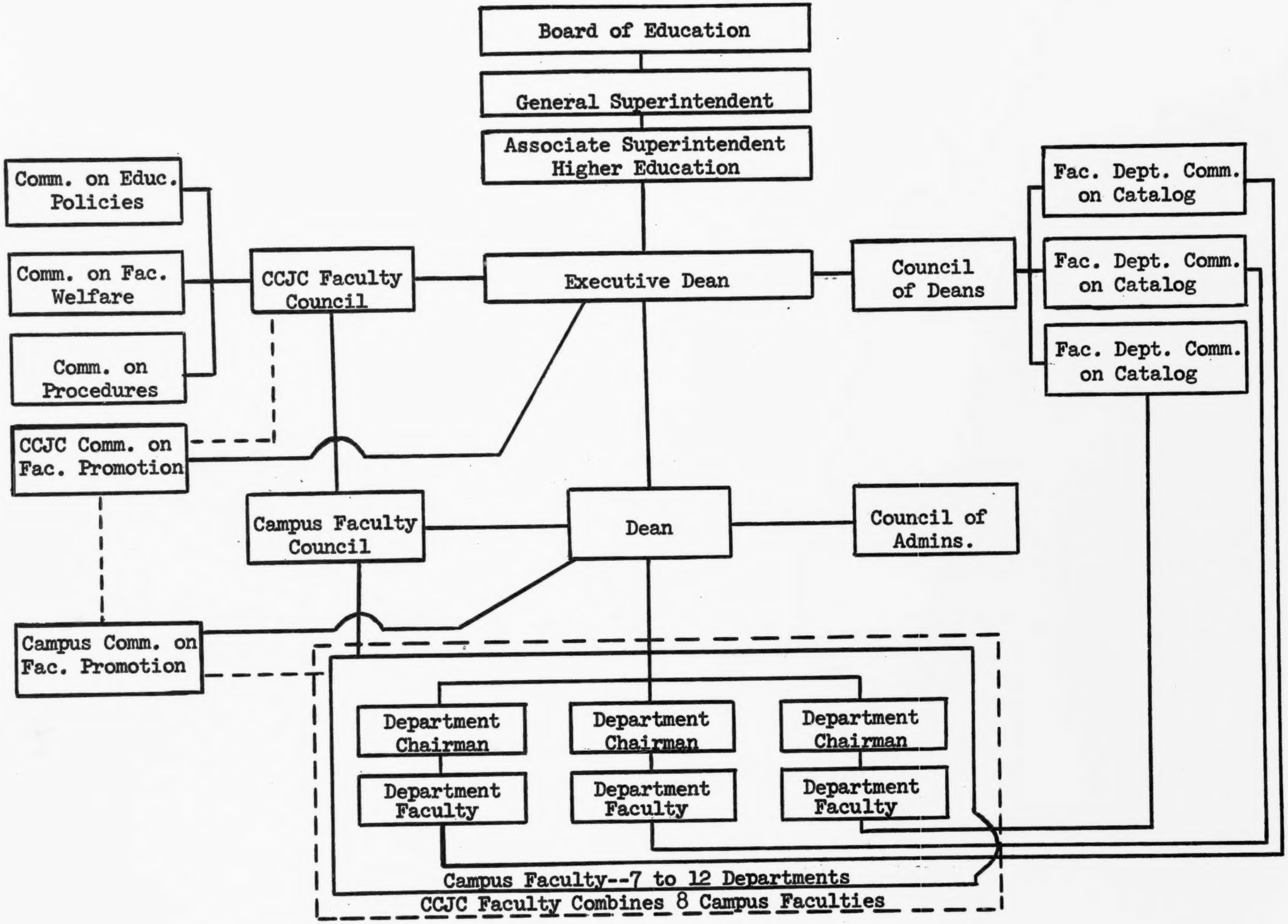
NORTH CAROLINA STATE BOARD OF EDUCATION
DEPARTMENT OF COMMUNITY COLLEGES


State Board of Education
Controller
Director
State Department of Public Instruction
Associate Director (State Director Voc. Ed.)
Business Manager
Administrative Assistant
Fiscal Affairs
Construction
Libraries
Equipment
Enrollment Data
Head
Evaluation & Accreditation Division
Educational Director
Academic Division
Educational Director
General Adult & Community Service Div. & Student Personnel Services
Supervisor
Special Educational Program Section
Educational Director
Vocational-Technical Division
Director
Industrial Services Division

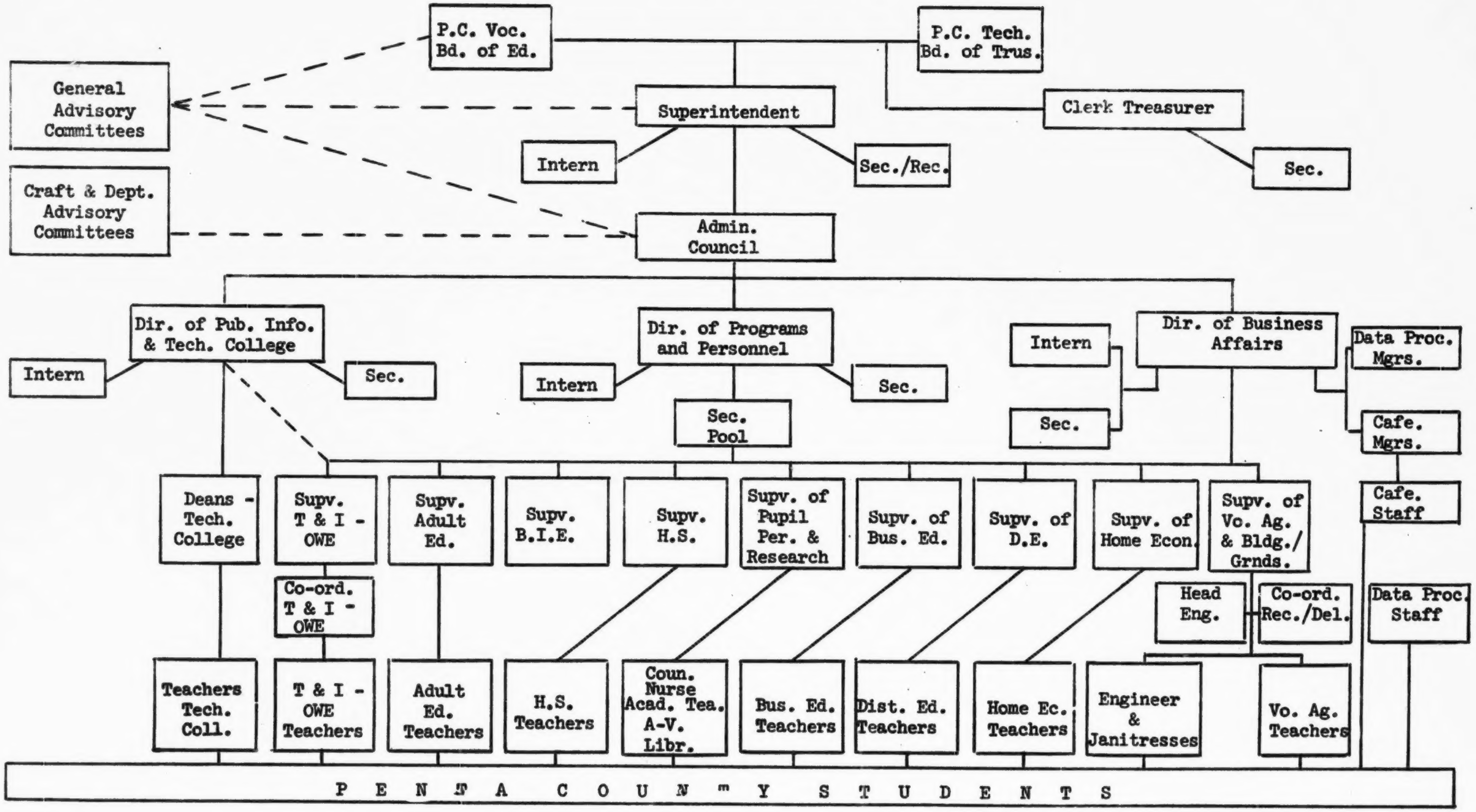
CHICAGO CITY JUNIOR COLLEGE BRANCH ORGANIZATIONAL CHART


Board of Education
General Superintendent
Associate Superintendent Higher Education
Executive Dean
Dean of Branch
Dean TV College
Assistant to Executive Dean
Assistant Dean Personnel & Planning
Assistant Dean Operations
Engineer - Custodians
Director, Student Personnel Services
Registrar
Director of Counseling
Director of Admissions Veterans Job Placement
Director of Student Activities
Treasury and Budget
Lunch Room
Main and Equipment
Plant Operations
Assistant Registrar
Assistant Director of Counseling
Department Chairmen
Faculty
Administrative Assistant Evening School Director

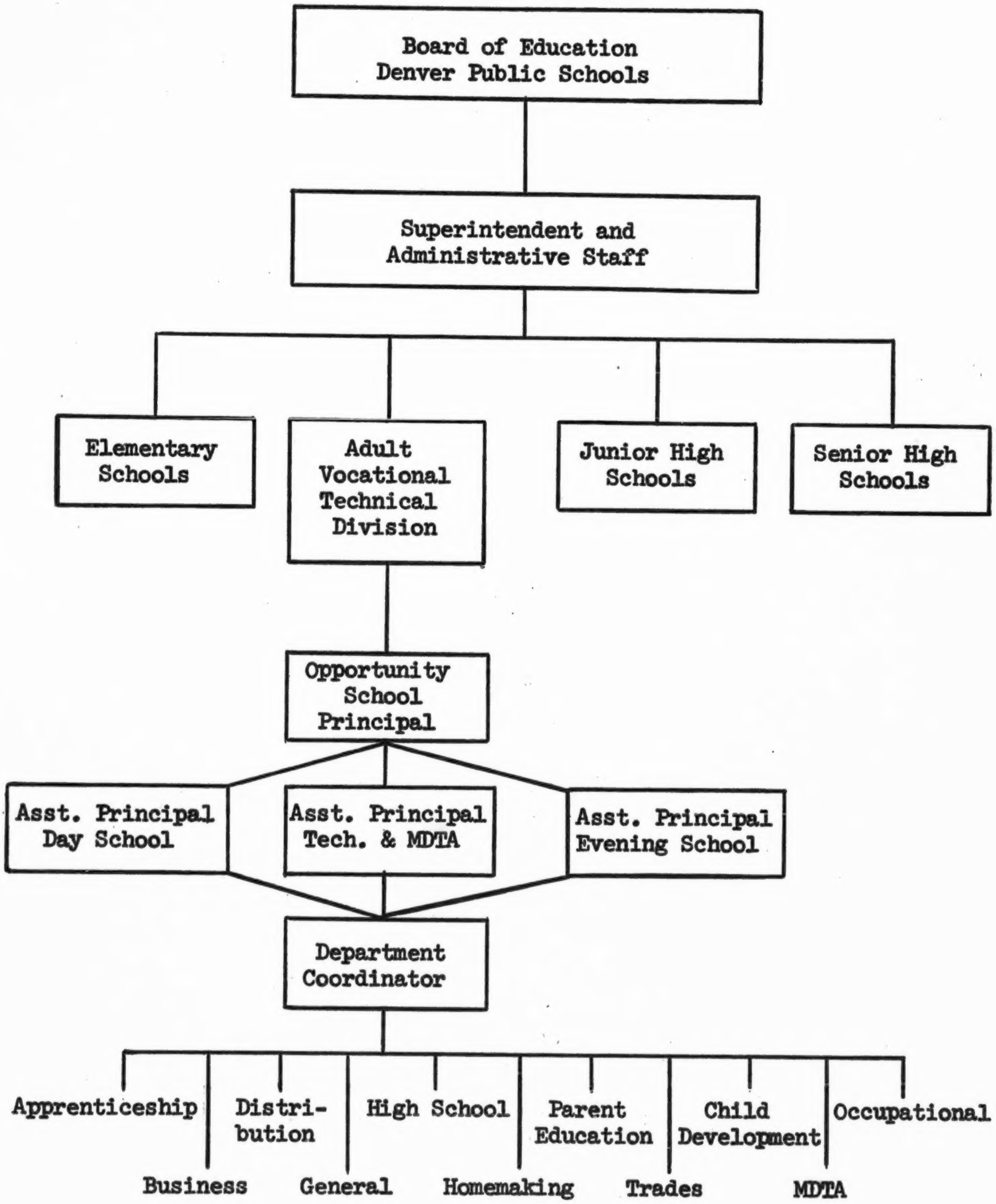
CHICAGO CITY SCHOOLS


Board of Education
General Superintendent
Associate Superintendent Higher Education
Comm. on Educ. Policies
Comm. on Fac. Welfare
Comm. on Procedures
CCJC Faculty Council
Executive Dean
Council of Deans
Fac. Dept. Comm. on Catalog
Fac. Dept. Comm. on Catalog
Fac. Dept. Comm. on Catalog
CCJC Comm. on Fac. Promotion
Campus Faculty Council
Dean
Council of Admins.
Campus Comm. on Fac. Promotion
Department Chairman
Department Chairman
Department Chairman
Department Faculty
Department Faculty
Department Faculty
Campus Faculty--7 to 12 Departments
CCJC Faculty Combines 8 Campus Faculties

PENTA COUNTY VOCATIONAL BOARD OF EDUCATION - PERRYSBURG, OHIO

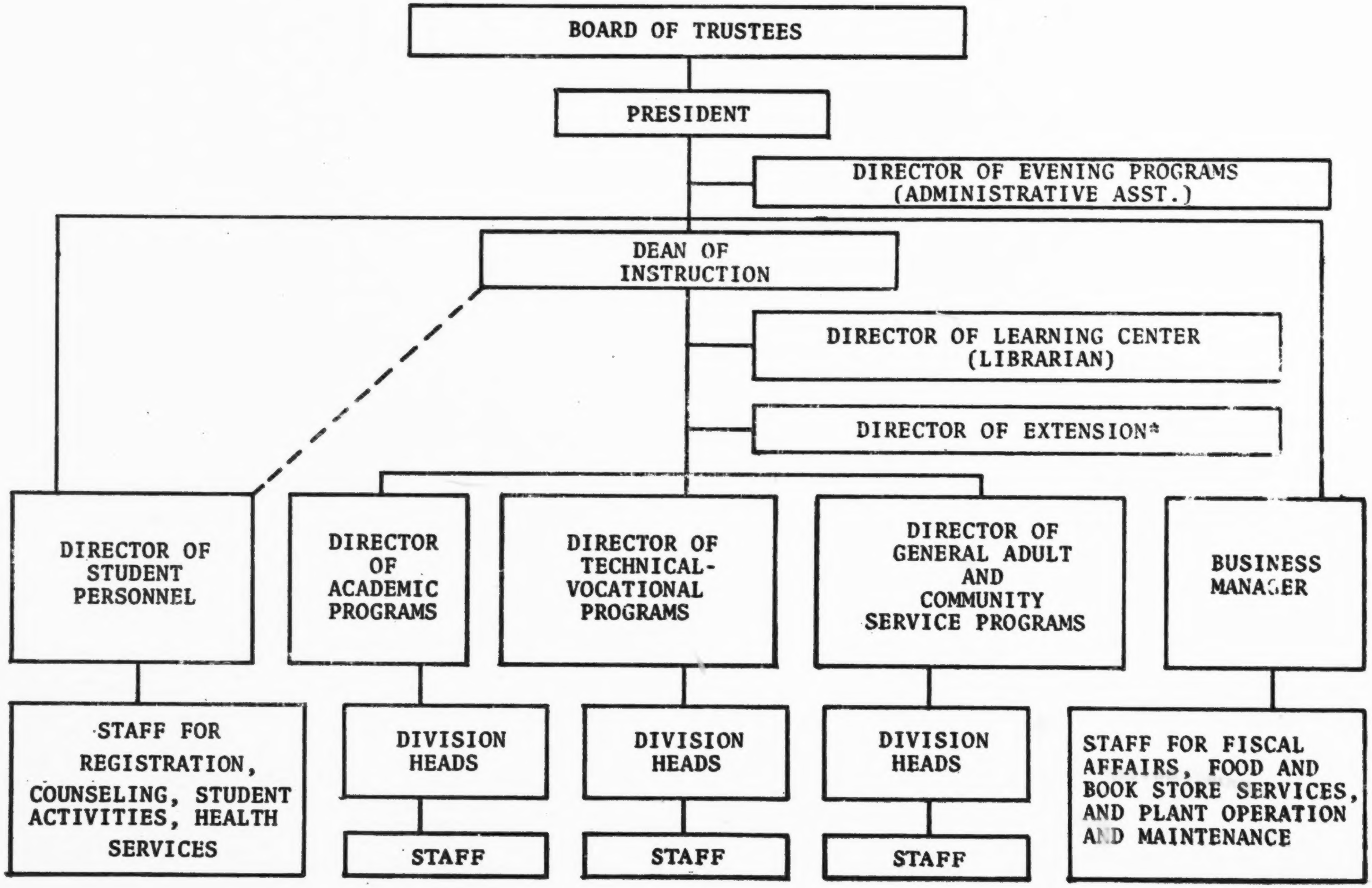

P.C. Voc. Bd. of Ed.
P.C. Tech. Bd. of Trus.
General Advisory Committees
Superintendent
Clerk Treasurer
Intern
Sec./Rec.
Sec.
Craft & Dept. Advisory Committees
Admin. Council
Dir. of Pub. Info. & Tech. College
Intern
Sec.
Dir. of Programs and Personnel
Intern
Sec.
Sec. Pool
Intern
Sec.
Dir. of Business Affairs
Data Proc. Mgrs.
Cafe. Mgrs.
Cafe. Staff
Deans - Tech. College
Supv. T & I - OWE
Co-ord. T & I - OWE
Supv. Adult Ed.
Supv. B.I.E.
Supv. H.S.
Supv. of Pupil Per. & Research
Supv. of Bus. Ed.
Supv. of D.E.
Supv. of Home Econ.
Supv. of Vo. Ag. & Bldg./ Grnds.
Head Eng.
Co-ord. Rec./Del.
Data Proc. Staff
Teachers Tech. Coll.
T & I - OWE Teachers
Adult Ed. Teachers
H.S. Teachers
Coun. Nurse Acad. Tea. A-V. Libr.
Bus. Ed. Teachers
Dist. Ed. Teachers
Home Ec. Teachers
Engineer & Janitresses
Vo. Ag. Teachers
PENTA COUNTY STUDENTS

DENVER CITY SCHOOLS


Board of Education Denver Public Schools
Superintendent and Administrative Staff
Elementary Schools
Adult Vocational Technical Division
Junior High Schools
Senior High Schools
Opportunity School Principal
Asst. Principal Day School
Asst. Principal Tech. & MDTA
Asst. Principal Evening School
Department Coordinator
Apprenticeship
Business
Distribution
General
High School
Homemaking
Parent Education
Trades
Child Development
MDTA
Occupational

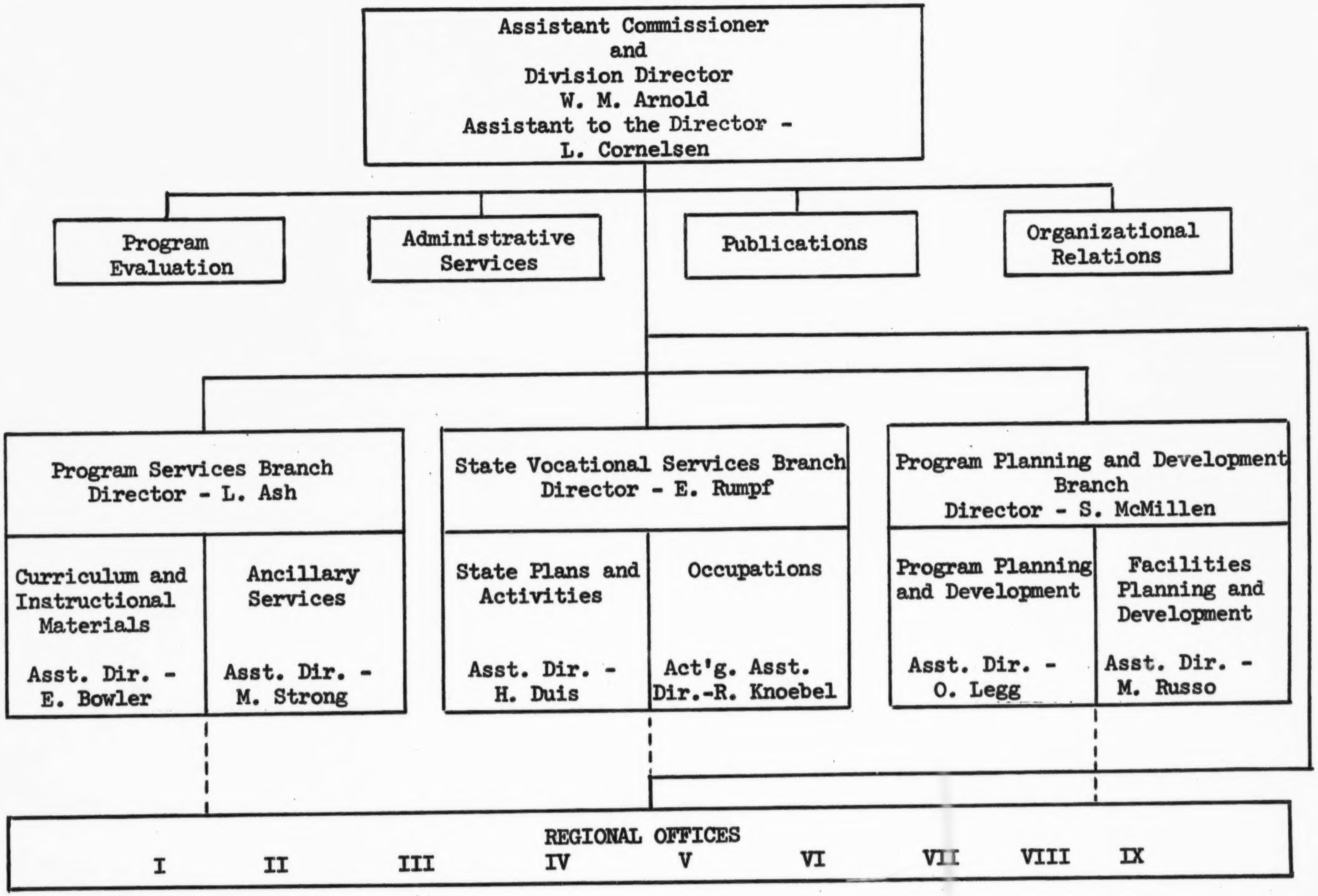
DEPARTMENT OF COMMUNITY COLLEGES
STATE BOARD OF EDUCATION
RALEIGH, NORTH CAROLINA

ADMINISTRATIVE AND SUPERVISORY ORGANIZATION CHART FOR INDUSTRIAL EDUCATION CENTERS, TECHNICAL INSTITUTES, AND COMMUNITY COLLEGES


BOARD OF TRUSTEES
PRESIDENT
DIRECTOR OF EVENING PROGRAMS (ADMINISTRATIVE ASST.)
DEAN OF INSTRUCTION
DIRECTOR OF LEARNING CENTER (LIBRARIAN)
DIRECTOR OF EXTENSION*
DIRECTOR OF STUDENT PERSONNEL
DIRECTOR OF ACADEMIC PROGRAMS
DIRECTOR OF TECHNICAL-VOCATIONAL PROGRAMS
DIRECTOR OF GENERAL ADULT AND COMMUNITY SERVICE PROGRAMS
BUSINESS MANAGER
STAFF FOR REGISTRATION, COUNSELING, STUDENT ACTIVITIES, HEALTH SERVICES
DIVISION HEADS
DIVISION HEADS
DIVISION HEADS
STAFF FOR FISCAL AFFAIRS, FOOD AND BOOK STORE SERVICES, AND PLANT OPERATION AND MAINTENANCE
STAFF
STAFF
STAFF

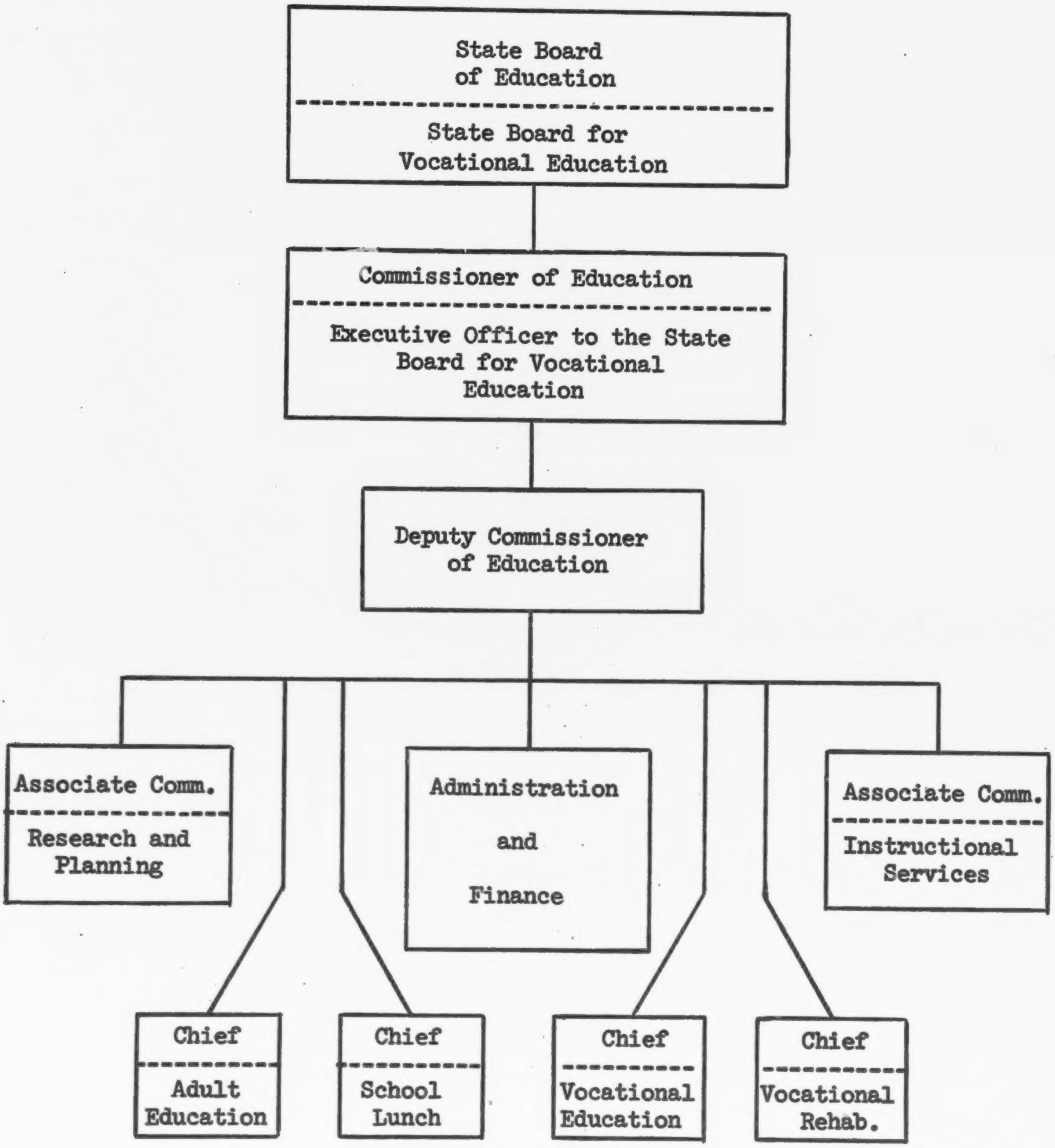
*Or under Director of General Adult and Community Service Programs if the institution finds this a more effective plan of organization.

U. S. OFFICE OF EDUCATION
BUREAU OF ADULT AND VOCATIONAL EDUCATION
DIVISION OF VOCATIONAL AND TECHNICAL EDUCATION


Assistant Commissioner
and
Division Director
W. M. Arnold
Assistant to the Director -
L. Cornelsen
Program Evaluation
Administrative Services
Publications
Organizational Relations
Program Services Branch
Director - L. Ash
Curriculum and Instructional Materials
Asst. Dir. - E. Bowler
Ancillary Services
Asst. Dir. - M. Strong
State Vocational Services Branch
Director - E. Rumpf
State Plans and Activities
Asst. Dir. - H. Duis
Occupations
Act'g. Asst. Dir.-R. Knoebel
Program Planning and Development Branch
Director - S. McMillen
Program Planning and Development
Asst. Dir. - O. Legg
Facilities Planning and Development
Asst. Dir. - M. Russo
REGIONAL OFFICES
I
II
III
IV
V
VI
VII
VIII
IX

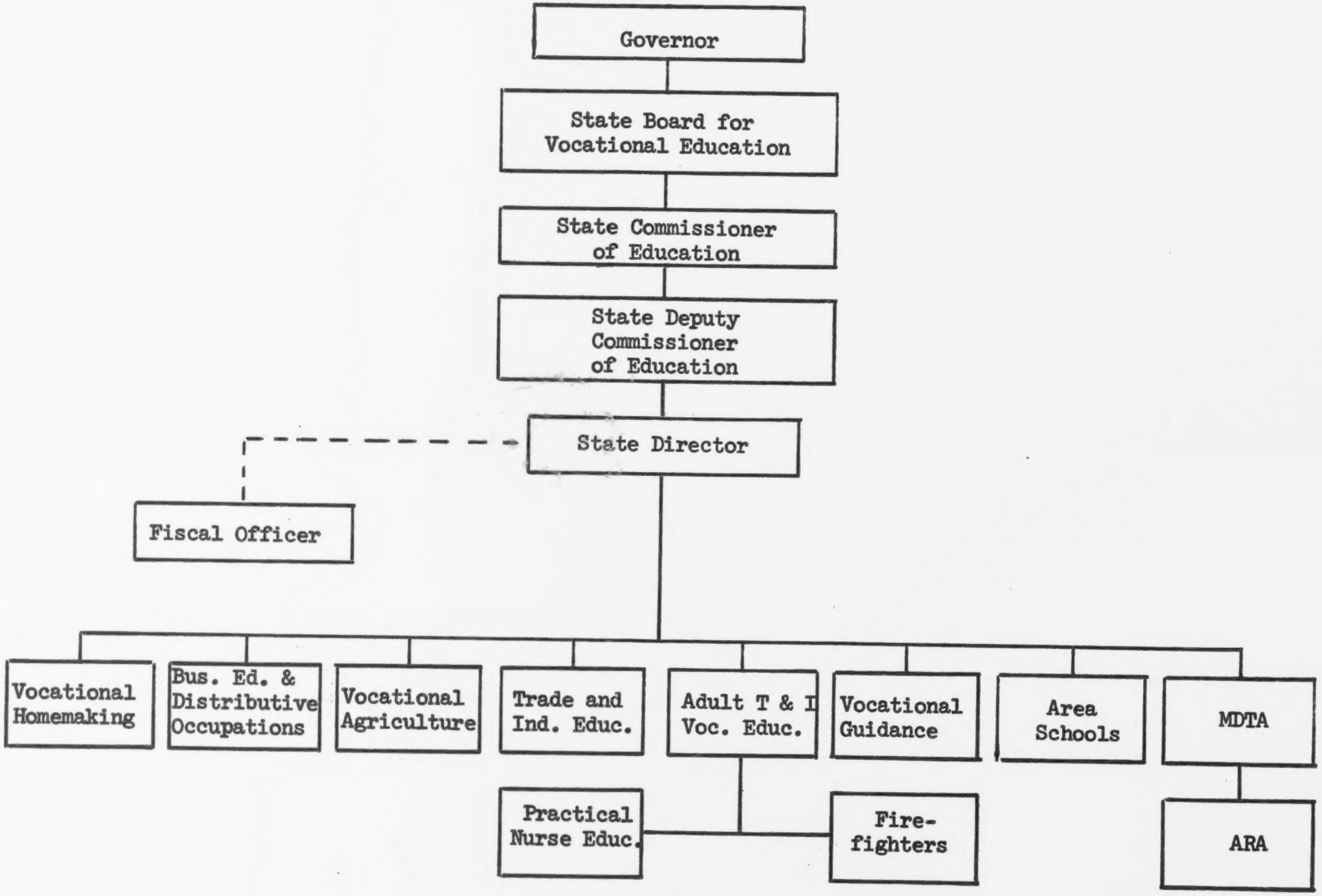
THE RHODE ISLAND STATE DEPARTMENT OF EDUCATION

ORGANIZATION - FUNCTIONS - SERVICES

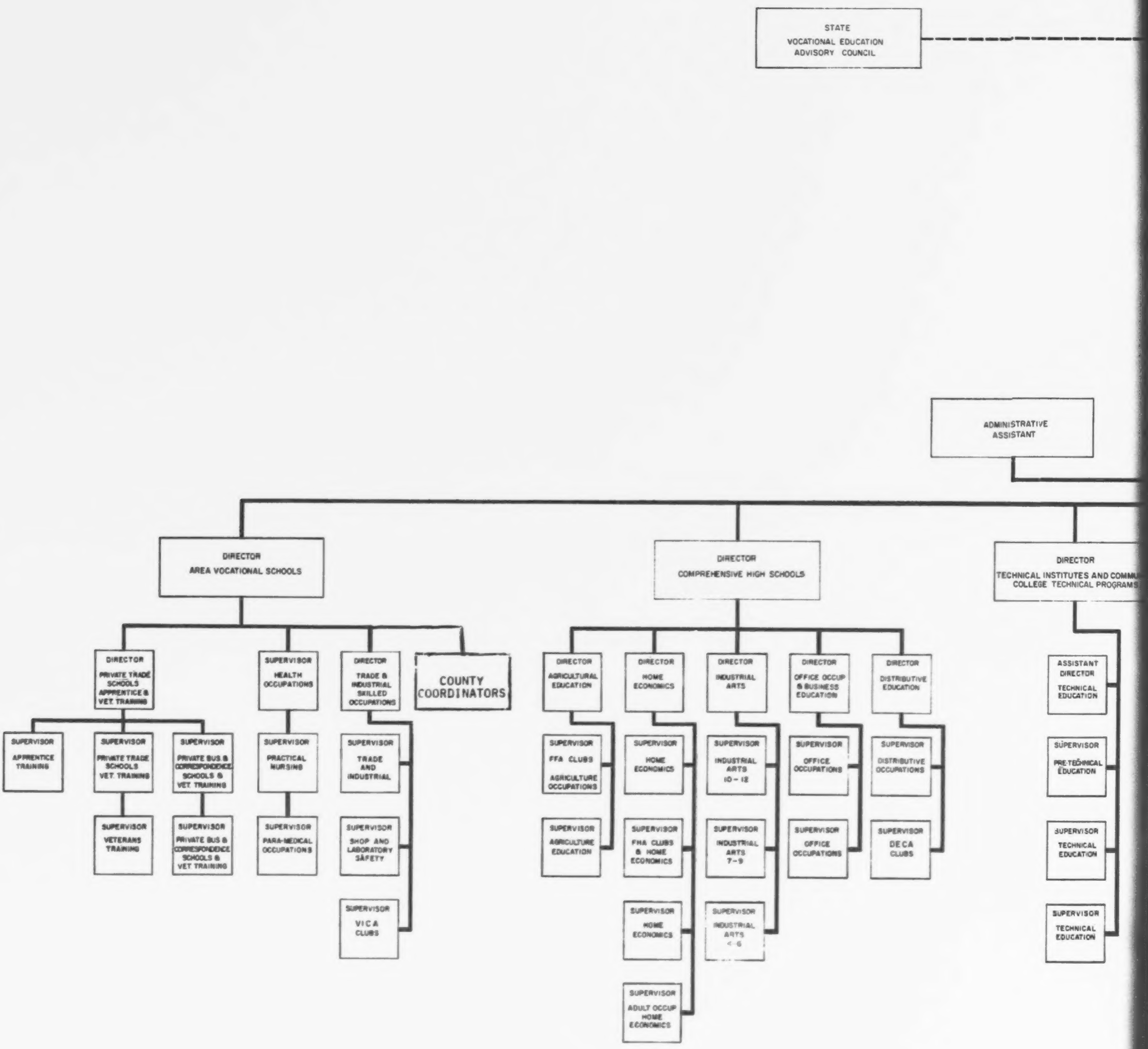

State Board of Education
State Board for Vocational Education
Commissioner of Education
Executive Officer to the State Board for Vocational Education
Deputy Commissioner of Education
Associate Comm.
Research and Planning
Administration and Finance
Associate Comm.
Instructional Services
Chief
Adult Education
Chief
School Lunch
Chief
Vocational Education
Chief
Vocational Rehab.

RHODE ISLAND

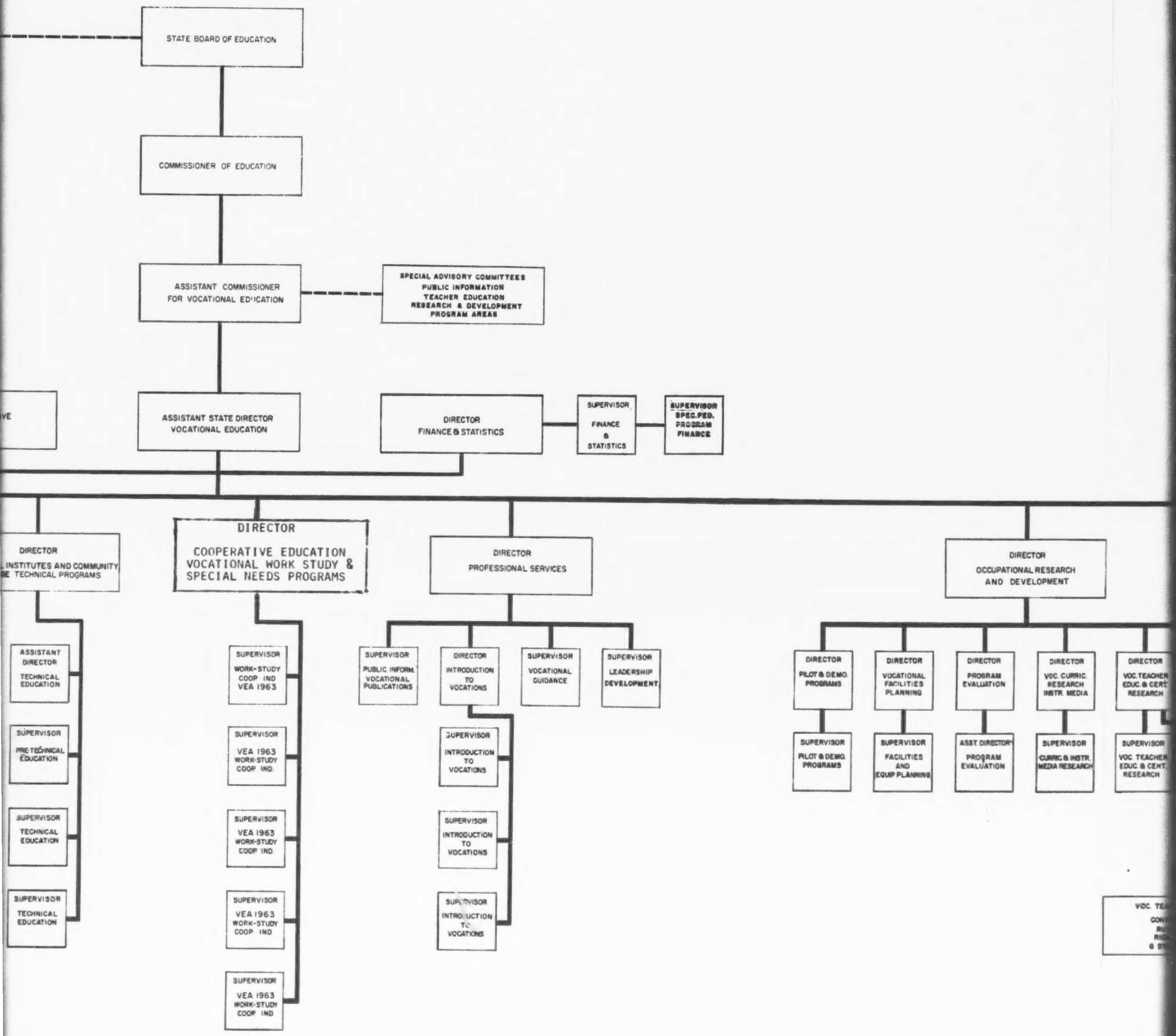
ORGANIZATION CHART - DIVISION OF VOCATIONAL EDUCATION


Governor
State Board for Vocational Education
State Commissioner of Education
State Deputy Commissioner of Education
State Director
Fiscal Officer
Vocational Homemaking
Bus. Ed. & Distributive Occupations
Vocational Agriculture
Trade and Ind. Educ.
Adult T & I Voc. Educ.
Vocational Guidance
Area Schools
MDTA
Practical Nurse Educ.
Fire-fighters
ARA

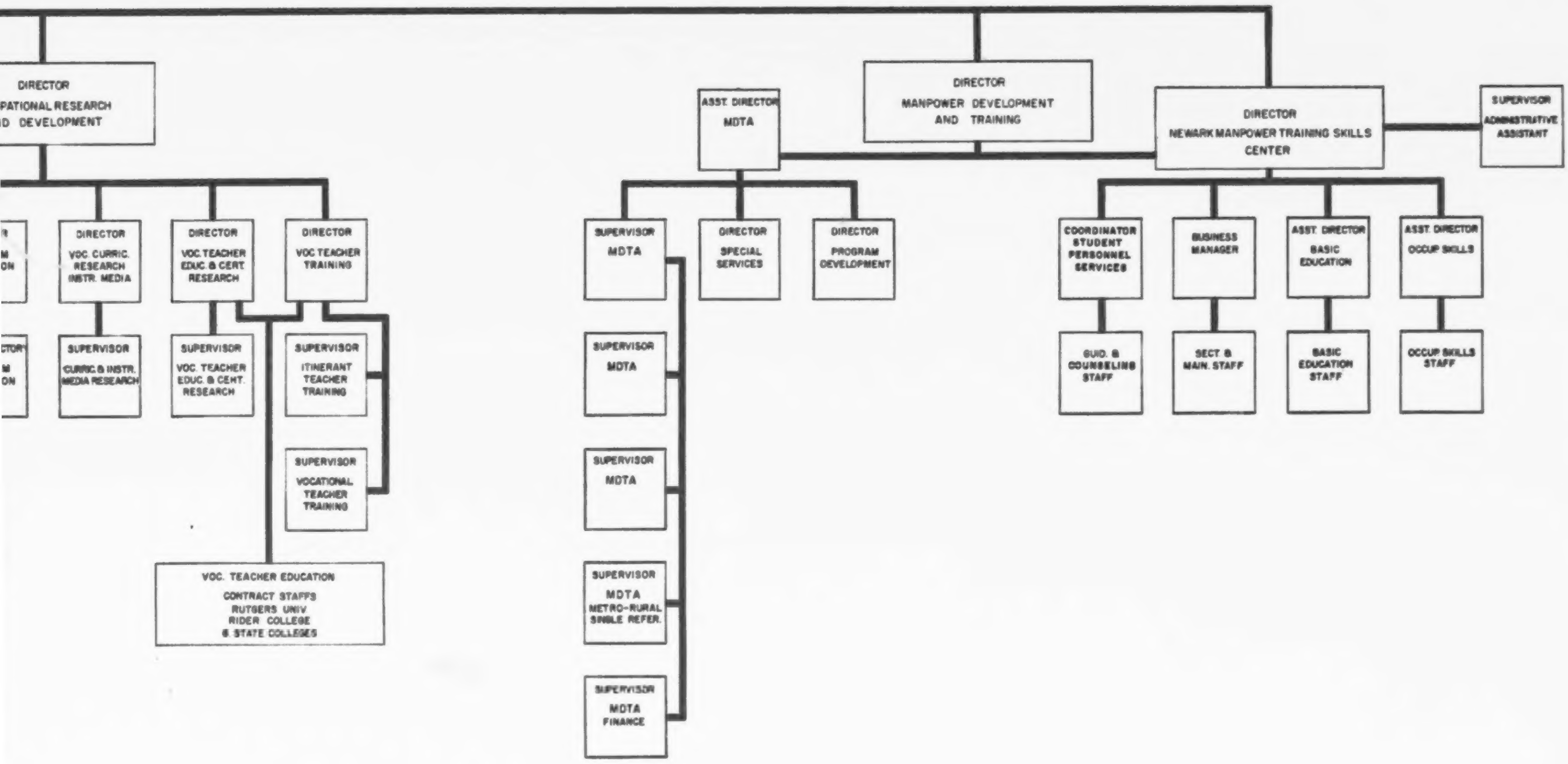
DIVISION OF VOCATION


STATE VOCATIONAL EDUCATION ADVISORY COUNCIL
ADMINISTRATIVE ASSISTANT
DIRECTOR AREA VOCATIONAL SCHOOLS
DIRECTOR PRIVATE TRADE SCHOOLS APPRENTICE & VET. TRAINING
SUPERVISOR APPRENTICE TRAINING
SUPERVISOR PRIVATE TRADE SCHOOLS VET. TRAINING
SUPERVISOR VETERANS TRAINING
SUPERVISOR PRIVATE BUS & CORRESPONDENCE SCHOOLS & VET. TRAINING
SUPERVISOR PRIVATE BUS & CORRESPONDENCE SCHOOLS & VET TRAINING
SUPERVISOR HEALTH OCCUPATIONS
SUPERVISOR PRACTICAL NURSING
SUPERVISOR PARA-MEDICAL OCCUPATIONS
DIRECTOR TRADE & INDUSTRIAL SKILLED OCCUPATIONS
SUPERVISOR TRADE AND INDUSTRIAL
SUPERVISOR SHOP AND LABORATORY SAFETY
SUPERVISOR VICA CLUBS
COUNTY COORDINATORS
DIRECTOR COMPREHENSIVE HIGH SCHOOLS
DIRECTOR AGRICULTURAL EDUCATION
SUPERVISOR FFA CLUBS AGRICULTURE OCCUPATIONS
SUPERVISOR AGRICULTURE EDUCATION
DIRECTOR HOME ECONOMICS
SUPERVISOR HOME ECONOMICS
SUPERVISOR FHA CLUBS & HOME ECONOMICS
SUPERVISOR HOME ECONOMICS
SUPERVISOR ADULT OCCUP HOME ECONOMICS
DIRECTOR INDUSTRIAL ARTS
SUPERVISOR INDUSTRIAL ARTS 10 – 12
SUPERVISOR INDUSTRIAL ARTS 7 – 9
SUPERVISOR INDUSTRIAL ARTS 4 – 6
DIRECTOR OFFICE OCCUP & BUSINESS EDUCATION
SUPERVISOR OFFICE OCCUPATIONS
SUPERVISOR OFFICE OCCUPATIONS
DIRECTOR DISTRIBUTIVE EDUCATION
SUPERVISOR DISTRIBUTIVE OCCUPATIONS
SUPERVISOR DECA CLUBS
DIRECTOR TECHNICAL INSTITUTES AND COMMU COLLEGE TECHNICAL PROGRAMS
ASSISTANT DIRECTOR TECHNICAL EDUCATION
SUPERVISOR PRE-TECHNICAL EDUCATION
SUPERVISOR TECHNICAL EDUCATION
SUPERVISOR TECHNICAL EDUCATION

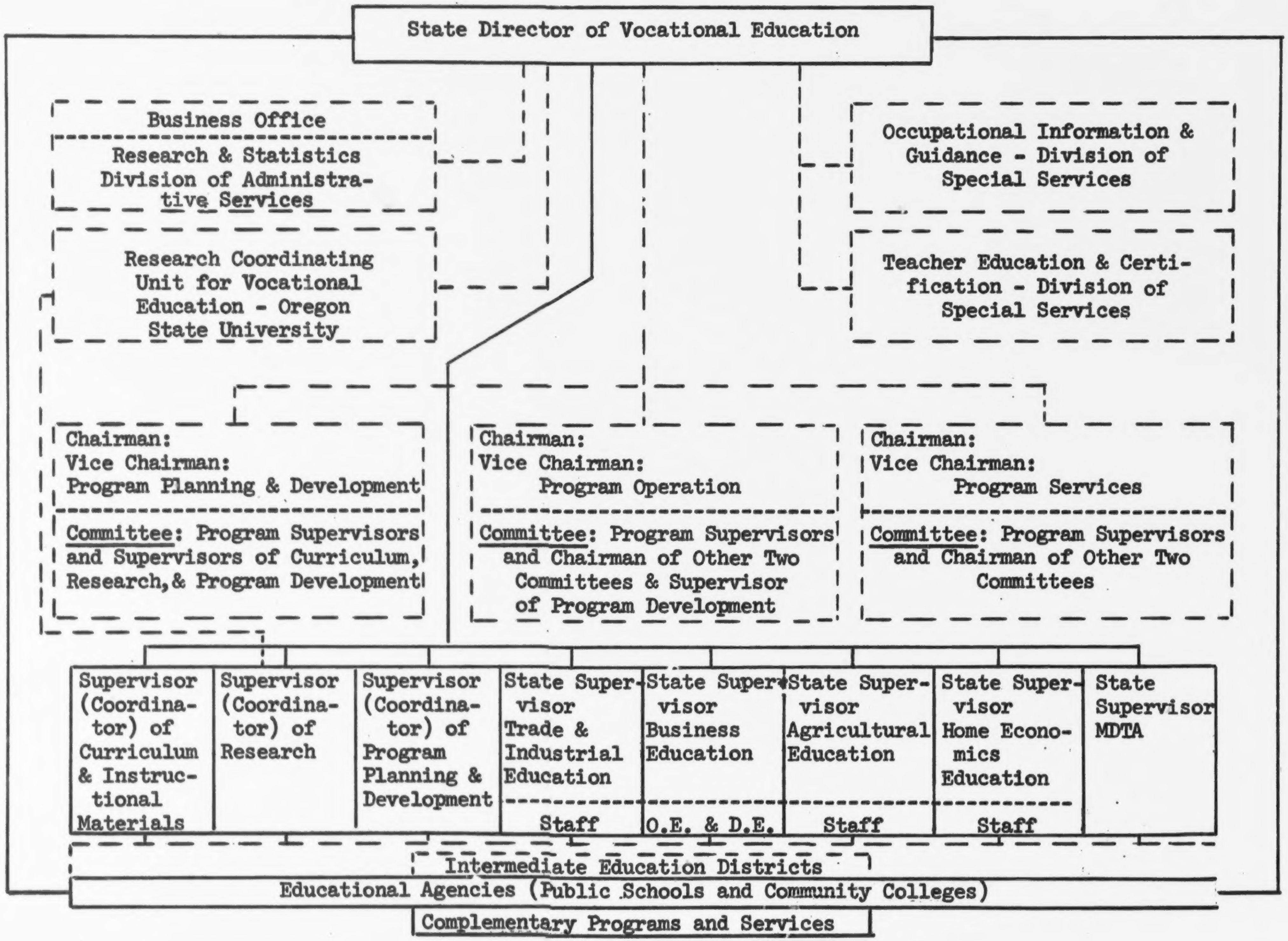
IONAL EDUCATION - NEW JERSEY DEPARTMENT


STATE BOARD OF EDUCATION
COMMISSIONER OF EDUCATION
ASSISTANT COMMISSIONER FOR VOCATIONAL EDUCATION
SPECIAL ADVISORY COMMITTEES
PUBLIC INFORMATION
TEACHER EDUCATION
RESEARCH & DEVELOPMENT
PROGRAM AREAS
VE
ASSISTANT STATE DIRECTOR VOCATIONAL EDUCATION
DIRECTOR FINANCE & STATISTICS
SUPERVISOR FINANCE & STATISTICS
SUPERVISOR SPEC.FED. PROGRAM FINANCE
DIRECTOR
INSTITUTES AND COMMUNITY
E TECHNICAL PROGRAMS
ASSISTANT DIRECTOR TECHNICAL EDUCATION
SUPERVISOR PRE-TECHNICAL EDUCATION
SUPERVISOR TECHNICAL EDUCATION
SUPERVISOR TECHNICAL EDUCATION
DIRECTOR
COOPERATIVE EDUCATION
VOCATIONAL WORK STUDY &
SPECIAL NEEDS PROGRAMS
SUPERVISOR WORK-STUDY COOP IND VEA 1963
SUPERVISOR VEA 1963 WORK-STUDY COOP IND.
SUPERVISOR VEA 1963 WORK-STUDY COOP IND.
SUPERVISOR VEA 1963 WORK-STUDY COOP IND
SUPERVISOR VEA 1963 WORK-STUDY COOP IND
DIRECTOR PROFESSIONAL SERVICES
SUPERVISOR PUBLIC INFORM. VOCATIONAL PUBLICATIONS
DIRECTOR INTRODUCTION TO VOCATIONS
SUPERVISOR VOCATIONAL GUIDANCE
SUPERVISOR LEADERSHIP DEVELOPMENT
SUPERVISOR INTRODUCTION TO VOCATIONS
SUPERVISOR INTRODUCTION TO VOCATIONS
SUPERVISOR INTRODUCTION TO VOCATIONS
DIRECTOR OCCUPATIONAL RESEARCH AND DEVELOPMENT
DIRECTOR PILOT & DEMO. PROGRAMS
DIRECTOR VOCATIONAL FACILITIES PLANNING
DIRECTOR PROGRAM EVALUATION
DIRECTOR VOC. CURRIC. RESEARCH INSTR. MEDIA
DIRECTOR VOC. TEACHER EDUC. & CERT. RESEARCH
SUPERVISOR PILOT & DEMO. PROGRAMS
SUPERVISOR FACILITIES AND EQUIP. PLANNING
ASST. DIRECTOR PROGRAM EVALUATION
SUPERVISOR CURRIC. & INSTR. MEDIA RESEARCH
SUPERVISOR VOC. TEACHER EDUC. & CENT. RESEARCH
VOC. TE
CON
RU
RI
& S

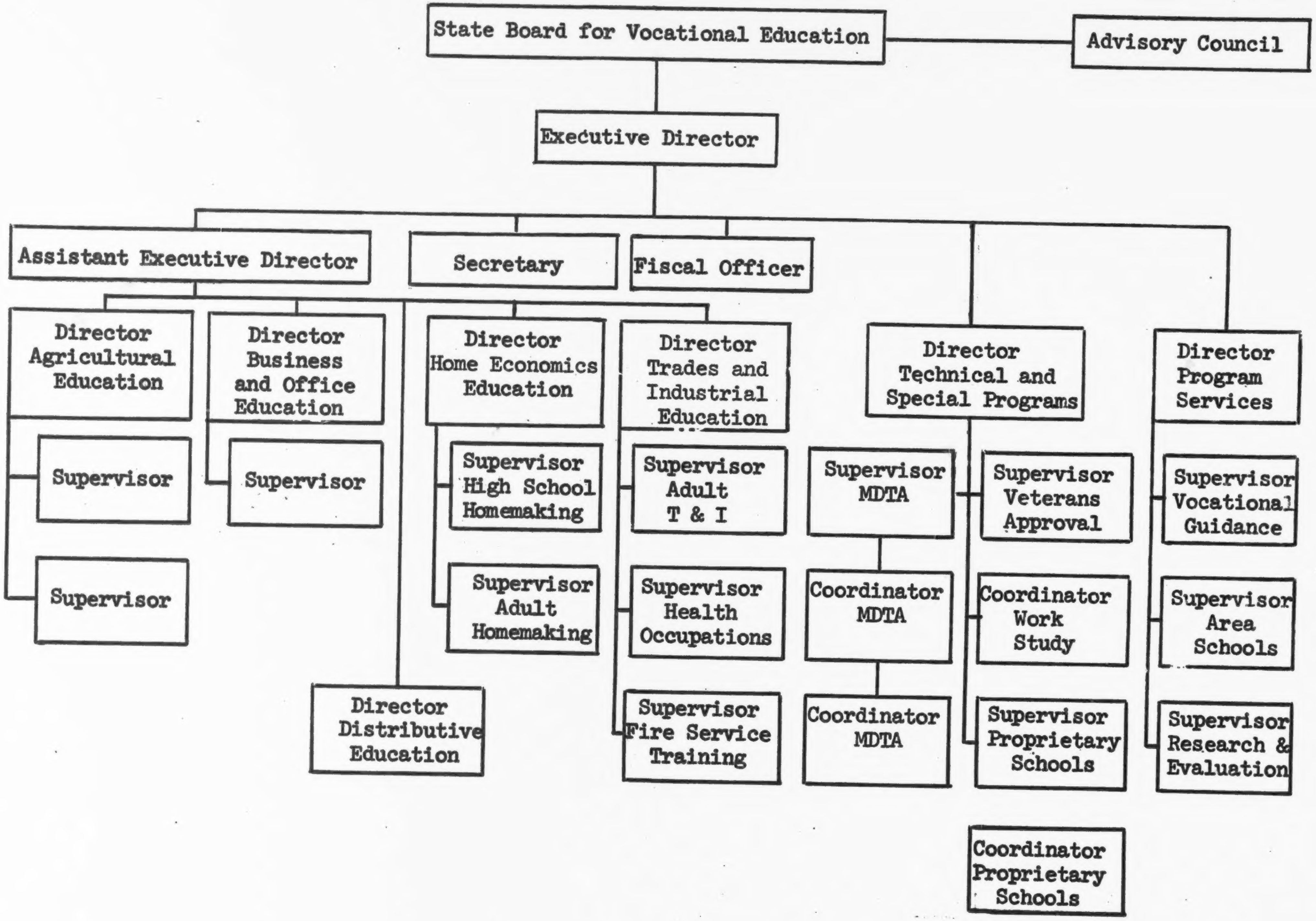
TMENT OF EDUCATION


DIRECTOR PATIONAL RESEARCH D DEVELOPMENT
R M ON
CTOR M ON
DIRECTOR VOC. CURRIC. RESEARCH INSTR. MEDIA
SUPERVISOR CURRIC. & INSTR. MEDIA RESEARCH
DIRECTOR VOC. TEACHER EDUC. & CERT. RESEARCH
SUPERVISOR VOC. TEACHER EDUC. & CERT. RESEARCH
DIRECTOR VOC. TEACHER TRAINING
SUPERVISOR ITINERANT TEACHER TRAINING
SUPERVISOR VOCATIONAL TEACHER TRAINING
VOC. TEACHER EDUCATION CONTRACT STAFFS RUTGERS UNIV RIDER COLLEGE & STATE COLLEGES
ASST. DIRECTOR MDTA
DIRECTOR MANPOWER DEVELOPMENT AND TRAINING
SUPERVISOR MDTA
SUPERVISOR MDTA
SUPERVISOR MDTA
SUPERVISOR MDTA METRO-RURAL SINGLE REFER.
SUPERVISOR MDTA FINANCE
DIRECTOR SPECIAL SERVICES
DIRECTOR PROGRAM DEVELOPMENT
DIRECTOR NEWARK MANPOWER TRAINING SKILLS CENTER
SUPERVISOR ADMINISTRATIVE ASSISTANT
COORDINATOR STUDENT PERSONNEL SERVICES
GUID. & COUNSELING STAFF
BUSINESS MANAGER
SECT. & MAIN. STAFF
ASST. DIRECTOR BASIC EDUCATION
BASIC EDUCATION STAFF
ASST. DIRECTOR OCCUP. SKILLS
OCCUP. SKILLS STAFF

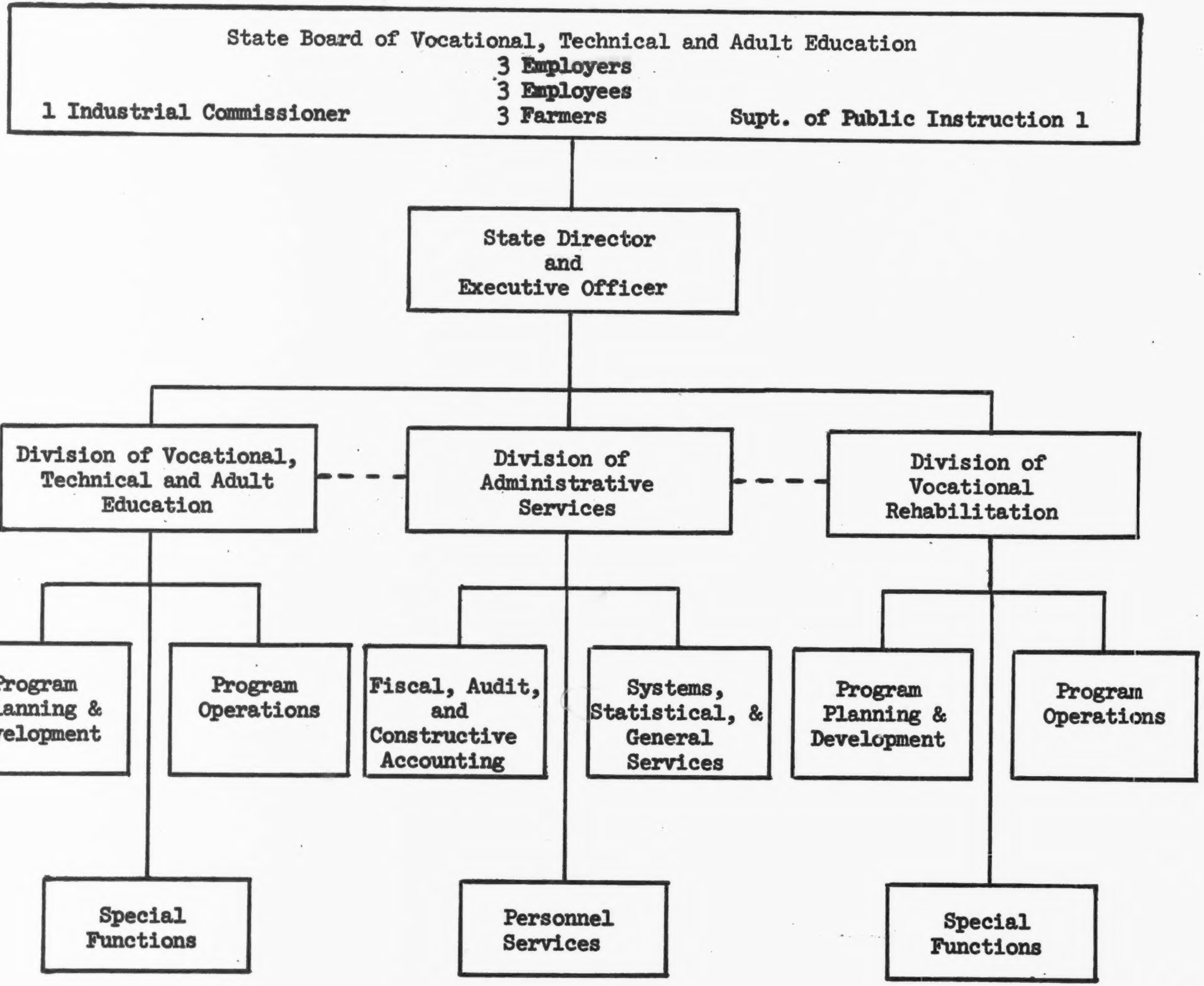
OREGON STATE DEPARTMENT OF EDUCATION - DIVISION OF VOCATIONAL EDUCATION


State Director of Vocational Education
Business Office
Research & Statistics Division of Administrative Services
Research Coordinating Unit for Vocational Education - Oregon State University
Occupational Information & Guidance - Division of Special Services
Teacher Education & Certification - Division of Special Services
Chairman:
Vice Chairman:
Program Planning & Development
Committee: Program Supervisors and Supervisors of Curriculum, Research, & Program Development
Chairman:
Vice Chairman:
Program Operation
Committee: Program Supervisors and Chairman of Other Two Committees & Supervisor of Program Development
Chairman:
Vice Chairman:
Program Services
Committee: Program Supervisors and Chairman of Other Two Committees
Supervisor (Coordinator) of Curriculum & Instructional Materials
Supervisor (Coordinator) of Research
Supervisor (Coordinator) of Program Planning & Development
State Supervisor Trade & Industrial Education
Staff
State Supervisor Business Education
O.E. & D.E.
State Supervisor Agricultural Education
Staff
State Supervisor Home Economics Education
Staff
State Supervisor MDTA
Intermediate Education Districts
Educational Agencies (Public Schools and Community Colleges)
Complementary Programs and Services

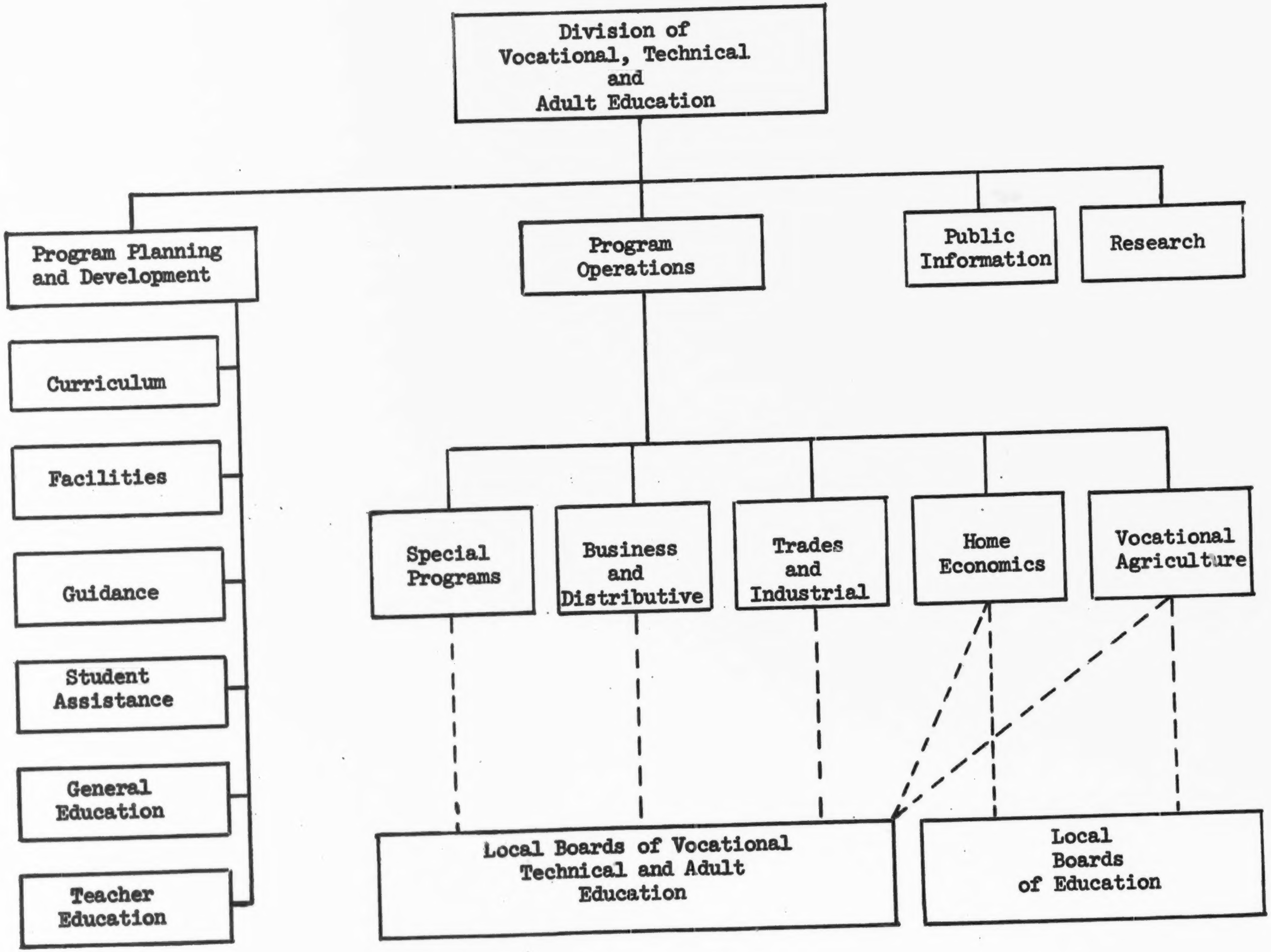
STATE BOARD FOR VOCATIONAL EDUCATION - DENVER, COLORADO


State Board for Vocational Education
Advisory Council
Executive Director
Assistant Executive Director
Secretary
Fiscal Officer
Director Agricultural Education
Supervisor
Supervisor
Director Business and Office Education
Supervisor
Director Distributive Education
Director Home Economics Education
Supervisor High School Homemaking
Supervisor Adult Homemaking
Director Trades and Industrial Education
Supervisor Adult T & I
Supervisor Health Occupations
Supervisor Fire Service Training
Director Technical and Special Programs
Supervisor MDTA
Coordinator MDTA
Coordinator MDTA
Supervisor Veterans Approval
Coordinator Work Study
Supervisor Proprietary Schools
Coordinator Proprietary Schools
Director Program Services
Supervisor Vocational Guidance
Supervisor Area Schools
Supervisor Research & Evaluation

WISCONSIN


State Board of Vocational, Technical and Adult Education
3 Employers
3 Employees
1 Industrial Commissioner
3 Farmers
Supt. of Public Instruction 1
State Director and Executive Officer
Division of Vocational, Technical and Adult Education
Division of Administrative Services
Division of Vocational Rehabilitation
Program Planning & Development
Program Operations
Fiscal, Audit, and Constructive Accounting
Systems, Statistical, & General Services
Program Planning & Development
Program Operations
Special Functions
Personnel Services
Special Functions

WISCONSIN


Division of
Vocational, Technical
and
Adult Education
Program Planning and Development
Program Operations
Public Information
Research
Curriculum
Facilities
Guidance
Student Assistance
General Education
Teacher Education
Special Programs
Business and Distributive
Trades and Industrial
Home Economics
Vocational Agriculture
Local Boards of Vocational Technical and Adult Education
Local Boards of Education

PART II

EVALUATION

A NOTE FROM THE AUTHORS

These guidelines for the evaluation of technical education programs have been prepared to assist administrators, supervisors, and teachers in the development of self-evaluation instruments.

The material has been developed for the evaluation of two-year, post-secondary, college level technical programs. However, it may readily be adapted for technical programs at other levels.

The contents are based on many years of experience in evaluation of technical education programs by the Connecticut State Department of Education, Division of Vocational Education. Consequently, they reflect philosophy and procedures as they pertain to technical education programs in that state. Self-evaluation instruments, however, should be based on the philosophy, goals, and objectives of the particular school system or institution being evaluated.

The guidelines presented here are intended to assist school personnel in cooperatively developing evaluative criteria for their school.

The writers wish to acknowledge the use of materials prepared by the Bureau of Vocational Technical Schools, Division of Vocational Education, Connecticut State Department of Education, and by the U. S. Office of Education, Division of Vocational and Technical Education, as bases and guides in the preparation of these guidelines.

Lucian Lombardi, Chief
Bureau of Technical Institutes
Connecticut State Department of Education

Carmelo Greco, Consultant
Bureau of Technical Institutes
Connecticut State Department of Education

THE EVALUATION OF TECHNICAL EDUCATION PROGRAMS

by

Lucian Lombardi* and Carmelo Greco*

The dictionary defines the word "evaluation" as "an accurate appraisal of value." Further, the word "appraisal" is defined as "an estimation of the amount, quality, or worth." Applied to technical education, evaluation can be redefined as "an accurate estimation of the amount, quality, or worth of technical education." An evaluation of an institution offering programs in technical education, as of all other types of educational institutions, concerns itself with the quality of performance as measured by various evaluative devices and the improvement of that performance.

As individuals, we are constantly concerned with the amount, quality, or worth of our efforts in performing our duties. Success is dependent upon them. We consciously or unconsciously perform an evaluation of our performances in order to improve ourselves. Further, private industry has devised many methods, procedures, and instruments that will improve the amount, quality, or worth of its operations in order to develop an efficient organization producing a profit to its stockholders. This is also true in education. Educators should constantly strive to estimate the amount and kind of education needed to enable an institution to provide quality programs, quality instruction, and efficient operation so as to maintain the worth of the institution. The end result of such an endeavor will be quality graduates who have acquired the necessary skills and education to enable them to enter their life work and to become useful citizens.

In any evaluation, there should be a willingness and desire for participation and a spirit of cooperation on the part of the institution and all of the staff members. It should be thoroughly understood by all that any evaluation made of an education program--whether in whole or in part--is meant to be constructive and not critical of any individual, operation, or school and is intended to reveal the strengths and weaknesses of the programs. Naturally, there should be a willingness and desire to remedy the weaknesses revealed by the evaluation; and to make any evaluation effective, it is essential that the philosophy and the goals and objectives of technical education be understood by all concerned: the evaluators and ones being evaluated. This is very important as the philosophy and goals and objectives differ greatly from those of a two-year liberal arts transfer program which is academic in nature. Not understanding or being unwilling to understand will result in an unfair and improper evaluation of an institution having technical education programs.

The philosophy of technical education may be expressed as follows:

1. Preparation of young people for immediate gainful employment in a constantly changing technical world.

---

*Mr. Lombardi is Chief of the Bureau of Technical Institutes, Connecticut State Department of Education, and Mr. Greco is Consultant, Bureau of Technical Institutes, Connecticut State Department of Education.

2. Preparation of young people for competence in citizenship and community living.

3. Preparation for social competency to achieve greater success in the satisfaction of human wants.

Preparation of young people for immediate gainful employment in a constantly changing technical world can be achieved by offering up-to-date quality programs--broad in scope. Specific training in the graduate's chosen field should be undertaken by his employer. The up-to-date quality programs should meet the needs of industry in the area served by the school. Determination of the kinds of programs and their content may be made through surveys, evaluations, and the use of advisory committees. By utilizing such procedures, particularly evaluation, obsolete programs can be discarded and new programs identified. In programs designed to prepare for gainful employment, cognizance should be taken of the fact that some of the graduates will elect to continue their education in four-year colleges; hence the program should be open-ended.

Competence in citizenship and community living is achieved through general education (including the social sciences) courses. Courses in English, literature, economics, human psychology, etc., are an important and integral part of the curriculum. They are essential as a means of developing a well-rounded individual. There must be, however, a balance between general education and technical education. One should not be over-emphasized in favor of the other. Here again, an evaluation of the entire program will assist the institution to arrive at the proper proportions required in each area.

Preparation for social competency to achieve greater success in the satisfaction of human wants may be attained through some of the offerings in the general education and participation in student activities. Such student activities include participation in sports, student government, year-book, newspapers, school bands and orchestra, membership in student chapters of professional societies, and attendance at lectures in technical education or in the liberal arts, etc. These experiences all contribute to the preparation for social competency.

The goals and objectives of technical education provide the direction for technical education. They are the targets the school concentrates on in its efforts to secure a successful program. Therefore, there must be an understanding of them and an evaluation made to determine their appropriateness and effectiveness. They are based on the philosophy of technical education and supplement that philosophy.

Some of the goals and objectives of a technical education program are:

1. To develop broad base programs which will provide quality instruction for immediate gainful employment.

The success of this objective can be determined by:

a. Evaluation of placement of graduates.

b. Evaluation of results of graduate surveys.

c. Evaluation of reactions of employers of graduates.

d. Evaluation of programs in meeting industries' needs.

e. Evaluation of adequacy and up-to-dateness of facilities and equipment.

f. Evaluation of the instructional programs.

g. Evaluation of the use of advisory committees.

h. Evaluation of supporting services in guidance, library, and visual aids.

i. Evaluation of admission policies.

j. Evaluation of the qualifications of the professional staff.

2. To develop and offer programs that will lead to competence in citizenship and community living which may be accomplished by:

   a. Adequate balance of general education programs.

   b. Evidence that staff and students respect the rights and values of others.

   c. Adequate student government.

   d. Instructors qualified to teach general education subjects.

3. To develop and offer programs that will provide social competency through:

   a. Adequate student activities.

   b. Adequate student government.

Accreditation and Evaluation

Evaluation

In the educational process, when one speaks of accreditation, one must also speak of evaluation, for accreditation is based upon the result of an evaluation. Accreditation may be considered an end result, or reward, of a successful evaluation. The end result may be the authority to confer degrees or recognition of the institution that its programs meet specified standards.

Generally, an evaluation for accreditation involves the whole school in all of its aspects. Usually involved in an evaluation is an examination of:

a. The philosophy and objectives of the institution.

b. Its organization and control.

c. Its program or curricula for quality.

d. Its faculty for competency.

e. Its students with respect to admission policies, health services, and counseling services.

f. Its results, or study of graduates and placement.

g. Its resources which include physical plant and equipment, finances, and library services.

Thus, it can be readily seen that an evaluation is an appraisal of the amount, quality, or worth of technical education in an institution and is a necessary basis for accreditation.

Accreditation

Accreditation is the approval by some accrediting agency of the programs of an educational institution. Its chief purpose is to encourage better facilities and curricula that will result in quality education being offered to the students. Accreditation of an institution has come to be regarded as an indication that adequate academic standards are being maintained. Accreditation gives an institution a cloak of respectability which can hardly be achieved by any other method, and it seems to be necessary if the institution is to gain public acceptance.

Accreditation is mandatory in some states if an institution wishes to confer degrees. In other states, it is voluntary. In some of the technical fields, particularly in the paramedical fields, the programs and facilities must be approved by professional organizations that have established standards for the technical specialty. With the advent of new federal legislation providing federal funds for technical education, accreditation by a recognized accrediting agency is required if the institution wishes to participate. Some schools seek voluntary accreditation from a professional organization, such as the Engineers' Council for Professional Development, (commonly referred to as ECPD) to secure further recognition and emphasis of quality technician programs. Others seek accreditation from a regional accrediting agency in an effort to secure maximum transfer credit for those students wishing to complete their education in a four-year institution as well as to establish status.

The forms of accreditation vary, also. Regional accrediting agencies accredit the whole school and all of its program as a total package. Professional organizations and societies usually accredit programs, only. In the total package form of accreditation, a weak or sub-standard program may prevent the issuance of accreditation. Program accreditation, on the other hand, is sought usually for strong programs, capable of meeting standards. The period of accreditation may extend from one to ten years, depending upon the accrediting agency and the results of its evaluation. The length of time devoted to the evaluation preliminary to issuance of accreditation also varies and is again based on the policies of the accrediting agencies. Some are extensive, lasting three to four days; others are quite short. Evaluation time also depends on whether or not it is being made for reaccreditation and on how familiar the agency is with the programs and facilities of the institution. Membership of the evaluating team generally is made up of individuals who are familiar with the philosophy and objectives of the type of institution being accredited.

Accreditation by State

In the hierarchy of accreditation, accreditation by a State Department of Education, State Commission for Higher Education, State University, or a voluntary state organization usually carries the least significance because, generally, "the standards enforced by these groups are neither as high nor as scrupulously applied as those administered through regional associations." (Hillway, 1958.) In some states, accreditation is required of any institution that confers degrees. In other states, it is voluntary. Normally, the whole school and all of its programs are accredited. The kinds of accreditation may also vary. For instance, in Connecticut, which has a strong accrediting procedure, there are two kinds--licensure and accreditation. Licensure is given usually to new institutions seeking accreditation for the first time and is for a period of two years. Depending upon a subsequent evaluation and its results, an institution may again be licensed for a stipulated period or accredited for two or three years. Periodic evaluations and reaccreditation are required during the institution's first twelve or more years. At the end of twelve or more years of successful operation, "continuing accreditation" is awarded for a period of ten years. Thereafter, reevaluation is required at intervals of approximately ten years. In granting "continuing accreditation," the agency may waive the inspection or evaluation if the institution has been accredited by a national or regional accrediting agency.

Regional Accreditation

The most popular and universally accepted form of accreditation is that given by one of the six regional accrediting agencies in the nation. Until recently, institutions offering technical education programs could not be accredited by a regional agency because of the agency's reluctance to recognize the philosophies and objectives of such programs. However, regional accrediting agencies now are beginning to understand and accept the role of technical education in the total educational pattern and have begun to accredit technical institutes and community colleges offering technician programs. The standards of evaluation applied by a regional agency are qualitative and are applied to an institution as a whole. The New England Association of Colleges and Secondary Schools states in its standards:

> The areas of major concern in an evaluation and accreditation of an institution are organization and control, program, faculty, students, facilities, and resources. Applications for accreditation will not be considered until two years after graduation of the first class. Accreditation is granted for ten years. Continuation of accreditation after ten years is dependent upon the maintenance of established standards.

Standards of the six regional agencies are constantly reviewed and revised to meet changing conditions. Federal legislation requiring that an institution be accredited before it is eligible to participate in federal funds for technical education has created problems for some institutions, particularly new institutions or institutions which have been in existence for some time, but which have never sought accreditation. Usually an application for accreditation is not considered until one or two years after the institution's first graduating class. This imposes a hardship on new institutions. Hardships also are imposed on old institutions never before accredited because of the time-lag from application to accreditation. Recognizing these facts, regional agencies and some professional agencies have established another category of accreditation called "Recognition of Candidacy for Accreditation." This form of accreditation recognizes an institution's ability to meet all standards for full accreditation within a specified time. The requirements for Recognition of Candidacy for Accreditation established by the New England Association of Colleges and Secondary Schools state, in part:

> One class must be enrolled and normally one year of operation must be completed, and the institution must be developing in accordance with the general standards of the regional agency.

This type of accreditation may be enjoyed for a maximum of five years. An institution may request full accreditation at any time during that period. At the end of five years, a full evaluation must be made, and failure to gain accreditation at that time requires removal from Recognition of Candidacy for Accreditation.

Accreditation by Professional Organization or Agency

Various professional groups have, for many years, made a practice of exercising an accrediting function of specialized technical education programs. Such agencies include the Engineers' Council for Professional Development (ECPD) in the engineering technologies; and in the medical fields, The American Medical Association, Board of Certified Laboratory Assistants, and the Board of Schools of Medical Technologists of the American Society of Clinical Pathologists. The specialized nature of the standards developed by these professional agencies assures greater consideration for the technical education program than is provided by the general accrediting agencies. For this reason, this type of recognition is of great significance. It denotes the offering of quality programs, meeting high standards. Some professional agencies, such as ECPD, do require prior accreditation by a regional agency. The length of accreditation offered by ECPD is from one to six years. Accreditation is by programs only, although the whole school is covered in the evaluation for accreditation. Evaluation, because of its significance, is very extensive and quite in depth.

Evaluating Advisory Committees

A very effective means of evaluating an institution's technical programs, without regard to accreditation, is through the employment of evaluating advisory committees. The members of these advisory or consulting committees should be experts in their field. It is recommended that an evaluating advisory committee be appointed for each technology. Valuable advice may be obtained from each committee with respect to quality of the instruction, obsolete subjects in the curriculum, new subjects that should be included to meet current and new trends in the field, discarding of obsolete equipment, and recommendations for new, modern equipment. The utilization of such a committee will be of great benefit to the institution and should provide for closer working relationships between the institution and the employers of the graduates. Upon completion of the committee's tasks, the same committee may be retained as an advisory committee to the particular technology. This enables the institution to continue to consult with the group on other matters and to maintain its relations with people in the field.

Self-Evaluation

A self-evaluation should be made as a preliminary step to accreditation. In fact, most accrediting agencies provide a questionnaire which must be completed and submitted before the evaluation for accreditation is made by the agency. The questionnaire is a self-evaluation instrument and may serve as a medium for evaluation and improvement of the school and its program before the official visitation. In cases where the questionnaire may not be extensive and intensive enough to examine all phases of the institution's operation and programs, a more adequate self-evaluation instrument should be used. Perhaps the greatest benefits derived from accreditation are those benefits which result from the required self-evaluation.

However, self-evaluation prior to accreditation only is not sufficient. There is a lapse of several years between accreditation and re-accreditation. Self-evaluation should be continuous. Social, economic, technical, and educational changes are occurring constantly. What is appropriate and current today may be obsolete tomorrow.

The institution should develop self-evaluation instruments designed to evaluate all aspects of its operation--administration, curricula, staff, equipment, facilities, and all the other factors which contribute to the attainment of the school's goals and objectives. The goals and objectives also must be evaluated from time to time in view of changes in local, regional, state, and national needs, and of other educational institutions in the vicinity of the school.

All aspects covered in the instruments may be evaluated in one evaluation, or parts of it may be evaluated over a specified period of time. Generally, there should be evaluation of several aspects of the program in process at all times, with evaluation of the total program at intervals of several years. The self-evaluation may be formal or informal, but it must be done cooperatively between the staff and the administration with the understanding that it is a constructive evaluation and is not designed to criticize any individual or program. There must be, and this is important, a follow-up of all weaknesses discovered and implementation of indicated improvements as soon as possible after the evaluation.

If an institution is one of several under the jurisdiction of a central unit, the same self-evaluating instruments may be used cooperatively between the central unit and its constituents. The same principles as outlined above should apply.

Self-Evaluation Materials

The evaluative material which follows has been developed to assist persons concerned with the self-evaluation of post-secondary technical education programs and is based on the evaluation of each phase of the total school operation.

The checklists included consist of provisions, conditions, or characteristics found in good technical institutes. Although the lists are extensive, they are not all-inclusive. Some items may not be necessary or even applicable in every school while other important features or procedures may have been omitted and should be added in the appropriate places.

The use of five numbers is suggested to rate the performance of items on the checklists:

(5) Excellent

(4) Very Good

(3) Good

(2) Fair

(1) Poor

In addition a letter (M) might be used to indicate a provision or condition not being met but the need of which is questioned by the evaluators. The letter (N) might be used to indicate that the item does not apply in the particular situation.

It is hoped that this material will be helpful, as starting points, to personnel involved in cooperatively developing evaluative criteria for their schools.

Administration's Role in Evaluation

The administration and supervision of a modern technical institute carries with it a multitude of responsibilities for the administrator of the school. He is charged with the satisfactory functioning of the institution. His responsibilities include leadership in the educational program, in motivation and growth of the staff, in planning and striving to obtain adequate financing, in community, industrial and labor relations, and in management and maintenance of plant and equipment. He must be particularly sensitive to trends in education as well as in industry so that the school program may be constantly geared to meet the needs of the students and the community.

Administration is concerned with school evaluation in three ways:

1. In obtaining staff acceptance and cooperation for the evaluation--providing the climate.

2. In being evaluated itself as one of the parts of the total school operation.

3. In providing the leadership and ways and means of effecting indicated improvements.

Evaluation is, therefore, of vital concern to administration. It provides answers to such questions as: How are we doing? Is the program meeting the needs of those we serve? What can we do to improve? It provides an appraisal of the functioning of the total school program, and it can serve as a valuable in-service education program for the entire school personnel.

To be successful, evaluation must have the full understanding and whole-hearted support of the administrative staff. Evaluation must be a democratic process, and all people affected should be included. Considerable time must be spent in cooperatively developing an understanding of the need for evaluation and a consensus to engage in one, and in motivating the faculty to study and restate school objectives, to develop or modify evaluative criteria to meet local situations, to identify evaluation procedures, and to organize for and carry through the evaluation. The administrative staff must supply the democratic leadership required in these processes. How well they sell evaluation, how well they motivate their school personnel and convince them that evaluation will result in improvement will determine the success or failure of the entire project. To do this job effectively, the administrative staff must first be sold on it themselves.

Evaluation of Administrative Functions

Evaluation of administration should determine the effectiveness of the services rendered, showing strengths and weaknesses and indicate paths for improvement in performance of its functions and responsibilities which include:

1. Exertion of Educational Leadership
2. Organization and Supervision of Instructional Staff
3. Organization and Maintenance of the Educational Program
4. Promotion of Graduate Placement and Follow-up Studies
5. Initiation of Public Relations Activities
6. Organization and Management of Administration
7. Organization and Supervision of Non-Instructional Staff and Services
8. Operation and Maintenance of the School Plant.

Educational Leadership

The Administration has the major responsibility for educational leadership.

Check List

The Administration:

( ) 1. Helps new instructors with a well-organized orientation program.

( ) 2. Aids instructors in obtaining and using a variety of effective teaching materials.

( ) 3. Encourages staff to initiate improvements in instructional programs.

( ) 4. Aids in the development and procurement of a professional library.

( ) 5. Seeks a cooperative effort of the entire staff in policy making.

( ) 6. Maintains effective communications with staff.

( ) 7. Encourages professional growth of the administrative instructional staffs.

( ) 8. Encourages intradepartment and interdepartment communication and cooperation to provide well correlated and integrated programs.

( ) 9. Provides initiative and leadership in developing ideas for research, experimental, and pilot programs.

( ) 10. Participates in and contributes to community activities and services.

( ) 11. Is a member of, participates in, and contributes to professional education organizations and educational activities on local, state, and national levels.

( ) 12. Is acquainted with educational programs of other institutions in the area.

( ) 13. Keeps informed of changes affecting student needs and considers their effects on the educational program.

( ) 14. Is aware of technological changes and their possible effects on the educational program.

( ) 15. Keeps informed of local, state, and federal laws affecting the operation of the school program.

Organization and Maintenance of the Educational Program

The organization of an educational program should be concerned with the development of an effective teaching-learning environment.

Check List

The Administration:

( ) 1. Maintains a program of instruction in accordance with existing policies.

( ) 2. Adjusts teaching loads of department heads to provide for supervisory and administrative activities.

( ) 3. Provides for the maintenance of up-to-date records of all students.

( ) 4. Prepares individual student and staff schedules before the opening of school.

( ) 5. Considers room capacities and the type of instruction when scheduling class loads.

( ) 6. Has developed school services (health, library, and audio-visual) that are up to standards indicated in respective service bulletins.

( ) 7. Maintains a reasonable distribution of co-curricular staff assignments.

( ) 8. Has an effective policy on homework.

( ) 9. Encourages student activity programs to meet their needs and interests.

( ) 10. Has an up-to-date library of policy and procedure bulletins accessible to the staff.

( ) 11. Has an organized transportation program for curricular and co-curricular activities.

( ) 12. Provides for adequate curriculum materials and instructional supplies.

( ) 13. Provides for student personnel services commensurate to the school's needs.

( ) 14. Maintains an environment conducive to learning.

Organization and Supervision of Instructional Staff

The administration's plans for a continuing program of instructional improvements must include procedures for the supervision and professional growth of the staff.

Check List

The Administration:

( ) 1. Is familiar with policies and procedures pertaining to the instructional program of education.

( ) 2. Makes certain that all staff members understand the philosophy of technical education.

( ) 3. Makes certain that all instructors know and understand the goals and objectives of their subject field.

( ) 4. Makes certain that all staff members understand their duties and responsbilities.

( ) 5. Motivates and encourages staff members to develop and use lesson plans.

( ) 6. Makes provisions for the instructional staff to be cognizant of current instructional materials and encourages their use.

( ) 7. Maintains a file of all course outlines.

( ) 8. Encourages the instructional staff to carry on a continuing program of improvement.

( ) 9. Uses the facilities and personnel of the State Education Department to assist in the improvement of instruction.

( ) 10. Makes proper decisions in accordance with established policies concerning the instructional programs.

( ) 11. Maintains contact with students and evaluates their educational needs.

( ) 12. Encourages staff members to have an active role in the study and improvement of the instructional program.

( ) 13. Secures the cooperation of the staff in carrying out recommendations and policies.

( ) 14. Acts as general coordinator for all activities relative to the improvement of the instructional program.

( ) 15. Provides opportunities for instructors to try new practices and techniques.

( ) 16. Provides competent planned supervisory services to help instructors to increase their effectiveness.

( ) 17. Provides opportunities for staff members to observe instructional programs in other schools.

( ) 18. Encourages the staff to be active in professional organizations.

( ) 19. Encourages staff to participate in and contribute to community activities.

( ) 20. Encourages the staff to visit industries, and attend conventions, workshops, and conferences.

( ) 21. Makes certain that all new instructors recommended for employment meet certification requirements.

( ) 22. Encourages individual staff members to evaluate and consider how their personal traits and mannerisms affect their teaching.

( ) 23. Encourages the development of sympathetic understanding and friendly rapport between staff and students.

( ) 24. Has stimulated the preparation of a Faculty Handbook which outlines all matters concerning the school and staff.

Organization and Management of Administration

Sound administrative procedures must be followed to promote an efficient school operation.

Check List

The Administration:

( ) 1. Operates in conformity with established policies.

( ) 2. Reviews departmental record-keeping procedures for sound business management and conformance to existing policies.

( ) 3. Counsels the staff in proper accounting procedures.

( ) 4. Has records well organizaed and readily available for reference.

( ) 5. Involves the staff in the preparation of budgetary requests.

( ) 6. Has budgetary requests that are realistic, adequate, and forward looking.

( ) 7. Has budgetary requests that are well documented.

( ) 8. Maintains an accounting system containing all pertinent data.

( ) 9. Maintains up-to-date records of all school personnel.

( ) 10. Has departmental inventories on file in the office.

( ) 11. Maintains a file of supply, equipment, and maintenance contracts.

( ) 12. Provides for the safekeeping of records.

( ) 13. Has a program for determining needs and establishing priorities for supplies, equipment, and facilities.

( ) 14. Has work details well organized and appropriately delegated.

( ) 15. Has an administrative office that functions effectively and efficiently.

Promotion of Graduate Placement and Follow-Up Studies

The school should assist students and graduates to gain employment.

Check List

The Administration:

( ) 1. Involves the staff in follow-up studies of graduates and drop-outs.

( ) 2. Maintains close relationship with the local state employment office.

( ) 3. Has latest employment surveys.

( ) 4. Has an active alumni association and encourages its participation in graduate placements and follow-up studies.

( ) 5. Encourages the staff to be aware of manpower needs in their respective fields.

( ) 6. Has a recruiting policy which encourages industry to recruit prospective graduates.

( ) 7. Maintains complete and accurate students records.

( ) 8. Encourages the faculty to maintain membership and to be active in technical professional organizations.

( ) 9. Encourages faculty to maintain industrial contacts.

( ) 10. Encourages the use of school facilities by technical organizations.

Initiation of Public Relations Activities

Administration should initiate public relations programs and encourage the staff to foster school-community relations.

Check List

The Administration:

( ) 1. Makes use of all varieties of news media.

( ) 2. Is active in professional organizations, both technical and academic.

( ) 3. Promotes a program of visitations between the staff and industrial personnel.

( ) 4. Realizes the importance of the student and his parents in the public relations program.

( ) 5. Is aware of the needs and trends of the industrial community.

( ) 6. Involves the staff in disseminating information about the school.

( ) 7. Has an organized program designed to develop and maintain close relationship with industry.

( ) 8. Encourages staff members to arrange "plant tours" with students.

( ) 9. Has an active general consulting committee.

( ) 10. Has an organized program designed to develop and maintain close relationship with labor organizations.

( ) 11. Has an organized program designed to develop and maintain close relationship with area boards of education, superintendents, school administrators, and guidance counselors.

( ) 12. Has an organized program designed to develop and maintain close relationship with the local state employment offices.

( ) 13. Has continuing newspaper, radio, and T.V. publicity.

( ) 14. Participates in community civic organizations and encourages staff membership to do likewise.

( ) 15. Has a planned, well-organized, effective, continuous public activities program.

Organization and Management of Non-Instructional Staff and Services

The non-instructional staff performs services vital to the support and efficient operation of the educational program. The school nurse, cafeteria, office and custodial staffs constitute this group.

Check List

The Administration:

( ) 1. Has an organized plan designed to develop and maintain close relationship with teaching and non-instructional staff.

( ) 2. Maintains a competent, adequate office and clerical staff to take care of the clerical needs of the faculty.

( ) 3. Encourages the non-instructional staff to be courteous and efficient.

( ) 4. Makes provision for a satisfactory lunch schedule for all school personnel.

( ) 5. Provides adequate personnel for the operation of the lunch program.

( ) 6. Provides for periodic inspection of the food handling facilities by health services.

( ) 7. Maintains a competent, adequate custodial staff for maintenance and custodial work.

( ) 8. Promotes in-service training and occupational growth of all non-instructional staff.

( ) 9. Has stimulated the preparation of a non-instructional handbook which sets forth all personnel policies concerning the non-instructional staff.

Operation and Maintenance of the School Plant

The operation and maintenance of the school plant entails programs of inspections, maintenance, and safety practices.

Check List

The Administration:

( ) 1. Formulates regulations regarding the use of the school plant and other school property.

( ) 2. Sees that regulations for use of facilities are adhered to.

( ) 3. Schedules fire drills for all school personnel.

( ) 4. Requires fire regulations to be observed at all times.

( ) 5. Requires the inspection of fire fighting equipment.

( ) 6. Has an organized inspection program of the plant and grounds involving staff members.

( ) 7. Has an organized program for the maintenance of the exterior of the building and the grounds.

( ) 8. Has an organized program for the maintenance of the interior of the building.

( ) 9. Has an organized health inspection program of the building, facilities, and the grounds.

( ) 10. Has established regulations and facilities to provide for orderly parking and traffic of all vehicles.

Instructional Program

Curriculum

The curriculum is the blueprint for achieving the institution's objectives. If the plan has been well prepared for the job to be done and if the plan is executed by competent personnel provided with adequate funds, it is likely that the students will receive a high quality education. In a technical education program, the curriculum is designed with objectives in (1) general education outcomes, (2) occupational outcomes, and (3) development of the individual student.

Evaluation of the curriculum should provide information for arriving at objective and subjective answers to such questions as: How well are the objectives being met? What contribution is each segment of the curriculum making towards the end goals? Is the course content pertinent, up-to-date? What revisions, deletions, additions are indicated? The evaluation should show not only how well we are doing but also how we may improve.

Preparation for employment is one of the main objectives of technical education. The curricula are designed to prepare the graduate for work in certain technical fields--electrical, mechanical, data processing, and so forth. Therefore, every effort should be made to keep the curricula up-to-date. Technicians and engineers from the particular technical areas probably were on the consulting committees which assisted in preparing the curricula; they should also be members of the evaluation teams. These men are working in the technical fields covered by the curricula. They are cognizant of changes and new developments in the fields which should be reflected by changes in the curricula. For example, an electronics curriculum prepared a few years ago would devote considerable time to the study of vacuum tubes. In today's electronics curriculum, comparatively little time is given to the study of vacuum tubes--the emphasis is on transistors and solid state devices. The experts working in the field are invaluable in helping keep the curricula up-to-date. They can provide much of the pertinent information and data required by the faculty to arrive at recommendations for curriculum improvement.

Preparation for employment is a distinguishing characteristic of technical education; it is not its sole purpose. Education should also prepare the individual for living in a democratic, affluent society as a participating and contributing member. It should prepare him to exercise individual freedom within a modern state (Sizer, 1966). Hence, general education--English, and the social sciences--should be an integral part of a technical curriculum. Technical institute curricula, in general, allot fifty percent of the total credit hours to general education courses and basic mathematics and sciences, and the other half to technical specialty courses.

General Education Courses

General education courses are those in the humanities, the social sciences, and the natural sciences designed to promote the intellectual growth of the students and their social and civic competence. In a technical education curriculum, these usually include courses in English, literature, and the social sciences--the natural sciences being considered related to the technical fields.

Organization

Check List

( ) 1. The curriculum includes at least 15 semester hours of general education courses.

( ) 2. All regular students are required to take these courses or corresponding electives.

( ) 3. Courses are planned to provide for sequential development from course to course.

( ) 4. Teacher load is such that necessary attention may be given to the work of individual students.

( ) 5. The courses challenge the abilities of all the students enrolled.

( ) 6. The courses stimulate intellectual growth.

( ) 7. There are provisions for diagnosis and remedial instruction.

( ) 8. There are provisions for ability groupings to meet varying levels of ability.

( ) 9. There is evidence of the application of these learnings in the social and academic environment of the institution.

English (Communication)

Check List

The courses aid the student:

( ) 1. To learn and use accepted forms of punctuation, spelling, abbreviation, paragraphing, and letter forms.

( ) 2. To develop skills in thinking, reading, writing, and speaking.

( ) 3. To organize effective and logical oral and written expression.

( ) 4. To develop and apply critical standards for the evaluation of what is heard, read, written, or spoken.

( ) 5. To learn the effective use of study aids such as dictionaries, reference books, bibliographies, and guides to periodical literature.

( ) 6. To develop and employ a creative and responsible use of language.

( ) 7. To develop skill in reading different types of material with speed and understanding.

( ) 8. To develop an interest in reading worthwhile books, newspapers, pamphlets, and magazines.

( ) 9. To learn to listen and to understand.

Literature

Check List

The courses promote social competence and intellectual growth through:

( ) 1. Developing knowledge of and appreciation of literary forms.

( ) 2. Sharing the works and thoughts of the great minds of yesterday and today.

( ) 3. Acquiring a sense of personal worth and of the dignity of man.

( ) 4. Achieving a sense of social and moral values and ideals.

( ) 5. Making other studies more meaningful.

( ) 6. Learning to understand people.

( ) 7. Acquiring understanding of social, political, and industrial trends.

( ) 8. Fostering desirable attitudes and personal traits.

( ) 9. Helping in the understanding and solution of personal problems.

( ) 10. Developing ability for critical judgment.

( ) 11. Improving oral and written communication.

( ) 12. Increasing speed of reading.

( ) 13. Increasing comprehension.

( ) 14. Increasing powers of concentration and application.

( ) 15. Acquiring an extensive general and technical vocabulary.

( ) 16. Acquiring selectivity and discrimination in reading materials.

( ) 17. Promoting broad avenues of interest.

( ) 18. Stimulating interest and good taste.

( ) 19. Developing desire for better use of leisure time.

( ) 20. Raising the cultural level of home life.

( ) 21. Promoting desire to read more extensively.

( ) 22. Acquiring a better understanding of our American heritage.

( ) 23. Acquiring a better understanding of our world-wide heritage.

Social Studies

Social studies courses in technical education programs include economics, applied psychology, human relations, social institutions, comparative government, and similar courses designed to arouse the student's curiosity as to his social environment and to develop an awareness of social problems and their implications. These courses should promote growth of social and civic competence and intellectual growth by:

Check List

( ) 1. Acquainting the student with significant elements of our social, political, and economic heritage.

( ) 2. Developing in the student an understanding of the impact of recent history upon peoples and their problems.

( ) 3. Developing in the student skill in analyzing social, economic, and political problems in terms of the history, geography, and cultures of the peoples involved.

( ) 4. Giving the student an understanding of the American economic system and the contributions made to that system by capital, labor, management, and the consumer.

( ) 5. Preparing the student to be an active, contributing member to this economic system.

( ) 6. Aiding the student to understand inter-relations among political, social, and economic problems and issues.

( ) 7. Encouraging students to assume responsibility for democratic action in the conduct of school activities.

( ) 8. Developing in the student the ability to discern and deal with propaganda.

( ) 9. Developing in the student a curiosity as to his social environment.

( ) 10. Developing in the student an awareness of social problems and their implications.

( ) 11. Developing in the student a critical approach to living in society.

( ) 12. Helping the student gain insight into the intricate and stubborn character of major social issues.

( ) 13. Helping the student understand his own behavior and the behavior of others.

( ) 14. Helping the student gain an understanding of the interaction of individuals with their social environment.

( ) 15. Acquainting the student with the organization, operation, and problems of federal, state, county, city, and town government.

( ) 16. Familiarizing the student with governments in other nations.

( ) 17. Developing the student's ability to work with and get along with others.

( ) 18. Helping the student gain an understanding of motivation, feelings, and emotions as related to his actions and to inter-personal relations.

( ) 19. Developing in the student creativity and flexibility to adjust to changes in social environment.

Basic Mathematics and Science Courses and Supporting Studies

Basic courses and supporting studies include courses in basic mathematics and science which form the foundation in varying degree to all technical specialty courses and the supporting or auxiliary courses which are fundamental to the technical specialty since they provide the student with a broader base for better understanding and for functioning more effectively in the specialty area. The former include such courses as mathematics (to the extent and depth required by the technology and level of technician being prepared), physics, and general chemistry. The latter include such courses as engineering drawing, for other than mechanical technology students, materials of engineering, manufacturing processes, electricity for non-electrical students, and Fortran for non-data processing students.

Organization

Check List

The basic courses and supporting studies are:

( ) 1. Well correlated and integrated with the technical specialty courses.

( ) 2. Of sufficient length and depth to provide:

  ( ) a. The fundamentals needed for the beginning job.

  ( ) b. The background required for growth on-the-job.

  ( ) c. The depth required for continuing of education.

( ) 3. Designed and taught so as to teach not only theory but its application to the solution of realistic problems.

( ) 4. Sufficient in number to provide the broad base required for better understanding and functioning in the specialty area.

( ) 5. Organized to develop an understanding of the fundamental mathematics and scientific principles and processes.

( ) 6. Organized to provide sufficient laboratory experiences to teach laboratory methods and techniques and the taking, analyzing, and reporting of data.

( ) 7. Organized to provide an adequate balance between theory and laboratory course hours.

Nature of Course Offerings

Check List

( ) 1. The courses are planned to provide for sequential development of the subject.

( ) 2. Course material is up-to-date.

( ) 3. Opportunities are provided for project work.

( ) 4. The courses provide for the varying abilities among the students.

( ) 5. Time is provided for remedial work.

( ) 6. The content of the courses is clearly applicable to the technical specialty.

( ) 7. The students understand the contributions these studies make toward preparing them for work in their technical specialty.

( ) 8. Laboratory work is provided in the materials and processes related to the technology.

( ) 9. The courses emphasize the fundamental sciences basic to the technical specialty.

( ) 10. The courses have clearly stated objectives which conform to the objectives of the technical curriculum and the school.

Technical Specialty Courses

The technical specialty courses include those courses designed to provide an extensive knowledge of a field of specialization and an understanding of the engineering and scientific activities which distinguish the technology of the field. These courses develop the special abilities which technicians must have to work in a particular engineering field.

Check List

The courses should:

( ) 1. Develop in the student a degree of competence and depth of understanding to ensure:

  ( ) a. Satisfactory proficiency for initial employment.

  ( ) b. Potential for growth on-the-job.

  ( ) c. Preparation for continuing education.

( ) 2. Develop in the student the ability to work independently as well as with others.

( ) 3. Develop in the student the ability to think rationally, and to anlayze and solve problems in his technical field.

( ) 4. Develop in the student qualities of leadership within his capabilities.

( ) 5. Be designed with inherent flexibility so that they may assimilate new technological and educational developments and discard obsolete methods and material.

( ) 6. Have clearly stated objectives which conform to the philosophy and objectives of the school and the curriculum.

( ) 7. Be sequential with subject matter carefully coordinated in groups of concurrent courses which are arranged to blend smoothly from one group of courses into the next.

( ) 8. Provide for the introduction of specialized technical course work in the first semester or term.

( ) 9. Develop in the student the ability to perform tests, analyze data, and prepare reports.

( ) 10. Provide adequate classroom and laboratory time with consideration given to the relationship between theory and laboratory classes.

( ) 11. Be designated to distinguish between laboratory and shop courses.

( ) 12. Develop in the student the necessary skills to perform the tasks usually required of technicians in the particular specialized area.

( ) 13. Develop in the student proficiency in the use of the scientific method in the application of basic principles in the individual's field of technology.

( ) 14. Develop in the student a thorough understanding and facility in the use of:

    ( ) a. Materials,

    ( ) b. Processes,

    ( ) c. Apparatus and equipment,

    ( ) d. Procedures and methods, and

    ( ) e. Techniques

commonly used to perform the work and provide the specialized services required of the technology.

( ) 15. Develop in the student a depth of understanding to enable the individual to establish effective rapport with the professional people with whom he will work.

( ) 16. Provide an extensive knowledge in the field of specialization with an understanding of the application of fundamental principles of the field to work and problem situations encountered by technicians.

( ) 17. Provide electives for students wishing emphasis on certain phases of a technology.

Instruction

Faculty

A competent professional faculty is one of the indispensable elements of a good school, for it is the teachers who work directly with the students to achieve the objectives of the curriculum and the school. Such a staff is not merely a group of individually competent persons, it is a cooperating group having common purposes and being motivated by common ideals.

Teachers are engaged constantly in the evaluation of their students and indirectly in the evaluation of their own performance and of the school.

A school evaluation will aid teachers in identifying their weaknesses and their strong points, in re-thinking objectives, and determining their success toward achieving these goals. It will motivate growth and change and may point out new goals and new paths for reaching them.

However, teachers are often apprehensive of formal school evaluations. Oftentimes such evaluations have meant considerable work, a lot of action, some criticisms, and recommendations but little in the way of implementation, improvement, and follow-up.

No evaluation can succeed without the full cooperation of the teachers. As professional people, teachers want to do a good job and to improve. They wish to cooperate individually and collectively for the effective operation of the school. They will support evaluation, if evaluation procedures and materials are cooperatively developed and applied by the entire school staff, if evaluation is based on progress rather than preconceived standards, if they are convinced evaluation techniques will lead to the identification of next steps to be taken and that every effort will be made to take these steps toward improvement of the total school program, and if they are involved in the evaluation of all school operations which affect the educational program.

Check List

Faculty members:

( ) 1. Have a diversity of experience within and outside their specialty field.

( ) 2. Are competently trained to undertake the tasks to which assigned.

( ) 3. Meet certification requirements and are certified.

( ) 4. Employ up-to-date methods of instruction.

( ) 5. Show evidence of constant professional growth.

( ) 6. Possess reasonable social development.

( ) 7. Show evidence of those personal traits requisite to teaching.

( ) 8. Possess those attributes which they seek to instill in their students.

( ) 9. Have a deep concern for the students.

( ) 10. Can converse with students at a level which the students can understand.

( ) 11. Are aware of the philosophies of education under which they are expected to teach.

( ) 12. Demonstrate evidence of seeking to identify and understand common educational problems and striving toward their solution.

( ) 13. Are enthusiastic and evidence high morale.

( ) 14. Work well together in coordinating course content and developing curricula.

( ) 15. Are reasonably oriented in the requirements for study in the particular technology with which associated.

( ) 16. Have a mastery of their subject fields substantially broader and in greater depth than that which they are expected to have their students attain.

( ) 17. Have an adequate amount of professional education courses.

( ) 18. Engage in continuous study of new methods and development of new materials for teaching.

( ) 19. Engage in continuous study of current developments in specialty fields.

( ) 20. Are professional in their requests and in meeting their responsibilities.

( ) 21. Are active in their technical and educational professional organizations.

( ) 22. Are active in community affairs.

( ) 23. Participate in promotion of school welfare.

( ) 24. Contribute to public relations efforts.

( ) 25. Cooperate fully in efforts to improve school program.

( ) 26. Encourage students to participate in total school program.

( ) 27. Motivate students to recognize the value of education.

( ) 28. Succeed in motivating a majority of the students to complete the program successfully.

( ) 29. Show evidence of flexibility and ability to adapt to changing situations.

Classroom

Check List

( ) 1. There is careful planning and preparation of instruction as evidenced by daily lesson plans and statements of objectives.

( ) 2. Provisions exist and are used to keep course outlines up-to-date.

( ) 3. Approved course outlines are available and in use.

( ) 4. Provisions are made for teachers to help special groups and individuals both for remedial and advanced work.

( ) 5. Time is provided in the teachers' daily schedules for preparation and correction of instructional assignments.

( ) 6. There is evidence of good rapport between instructors and students.

( ) 7. Provisions are made for challenging students of different degrees of ability.

( ) 8. Time is provided for problem solving in classroom.

( ) 9. Classroom assignments are corrected, helpful comments noted, and material returned to the student within a reasonable time limit.

( ) 10. Homework assignments are realistic and are carefully checked when handed in.

( ) 11. Lessons are well organized, present a reasonable amount of new concepts, and provide for use of the new ideas in realistic problems.

( ) 12. Frequent checks are made of student progress through quizzes, tests, special assignments, etc.

( ) 13. A variety of teaching methods are used depending on material to be taught and teaching situation.

( ) 14. Lessons present material in sequential form, preparing the students for each coming lesson.

( ) 15. Regular opportunities are provided for review and practice in the integration and use of previously learned material with new concepts in problem solving situations.

( ) 16. Field trips and outside sources are utilized to supplement instruction.

( ) 17. There is evidence of innovation and experimentation in development and use of instructional materials and in teaching and testing methods.

( ) 18. There is evidence of the use of a variety of instructional materials and audio-visual aids.

( ) 19. Instruction motivates students toward further study.

Laboratory

Check List

( ) 1. There is evidence that laboratory work is carefully planned to correlate and integrate with classroom instruction.

( ) 2. Provisions are made for development of skills in using instruments and equipment.

( ) 3. Laboratory assignments require students to inter-relate facts, figures, and concepts in the fields of science, mathematics, and technology.

( ) 4. There is evidence that laboratory work complements and supplements classroom instruction.

( ) 5. Laboratory work is organized in sequential form preparing the students, in steps, to work finally on their own.

( ) 6. A well-planned set of laboratory experiments is available.

( ) 7. Experiment sheets are quite detailed at the start and progress to those which contain just a statement of the problem.

( ) 8. Sets of laboratory instructions are available for the various laboratories and are given to each student at the start of the course.

( ) 9. More and more planning by the students is required as they progress through the laboratories.

( ) 10. Laboratories provide a broad variety of experiences ranging from basic to those intensive in practical experience.

( ) 11. Laboratory experiences teach students the use of scientific methods of inquiry and investigation.

( ) 12. Laboratory work teaches students to plan experiments, take and analyze data, and draw valid conclusions.

( ) 13. Laboratory work teaches students the use, limitations, and care of instruments and equipment.

( ) 14. Laboratory reports are corrected, helpful comments noted, and returned to the students before or at the next laboratory session.

( ) 15. Laboratory reports are corrected for English as well as for technical content.

( ) 16. A variety of laboratory reports are required, ranging from a short single page to a complete full-length report.

( ) 17. The technical laboratories provide practical work experiences similar to those the student will encounter on-the-job.

( ) 18. The technical laboratories have a large variety of instruments and equipment similar to those found in industrial laboratories.

( ) 19. Students work on experiments alone, or in groups, usually not larger than three, depending on the experiment requirements.

( ) 20. The laboratories are organized so that set-up time is reduced to a minimum.

( ) 21. A range of experiments are available to challenge the various ability groups.

( ) 22. Individual and group projects are available, and their use is encouraged.

( ) 23. Shop work aimed at developing manual skills is not included as part of laboratory time.

( ) 24. There is evidence that laboratory experiences develop a better understanding and appreciation for accuracy, dependability, validity, and honesty.

( ) 25. There is evidence that laboratory experiences develop resourcefulness, curiosity, inventivenss, and creativity.

Instructional Materials and Supplies

Modern educational methods and equipment require a prodigious amount of instructional materials and supplies. A $5,000 spectograph may have to stay unused for lack of a fifty-cent film strip. Copy reproducers are of little use if paper or transparency supplies are not available, and overhead projectors are useless without transparencies.

Check List

( ) 1. Instructors are encouraged to develop a large variety of instructional materials.

( ) 2. Facilities and equipment are available for the preparation and use of instructional materials.

( ) 3. Personnel is available for assisting the faculty in the preparation and use of instructional materials.

( ) 4. Faculty schedules provide time for preparation of instructional materials.

( ) 5. There are procedures, known to all concerned, for the purchasing of supplies and materials.

( ) 6. Adequate funds are provided for purchase of instructional supplies and materials.

( ) 7. Responsibility has been delegated and procedures developed for inventory control and for the ordering of replacements on time.

( ) 8. Adequate storage space is available for storage of materials and supplies.

Audio-Visual Aids

Objective:

To supplement and enrich the instructional program by the judicious use of audio-visual aids and to make effective use of new instructional methods through use of teaching machines, television, computerized instruction, and other new teaching devices.

The use of these aids is intended to facilitate and strengthen instruction and to complement and supplement the instructor, not to supplant him.

Check List

( ) 1. Audio-visual equipment and materials are located in an easily accessible room.

( ) 2. Facilities are provided for previewing, preparing, and producing audio-visual instructional devices.

( ) 3. Adequate audio-visual equipment and materials are available and accessible for efficient and timely use by instructors.

( ) 4. New equipment and developments are examined for their possible adaptation to programs.

( ) 5. Consideration is given to the rental of equipment rather than purchase wherever more feasible and economical.

( ) 6. All equipment on hand is well maintained and operable.

( ) 7. There is an operable plan for maintenance and replacement of obsolete equipment.

( ) 8. Adequate funds are provided in the budget for purchase of new equipment, rental of equipment, repair, and experimentation in new audio-visual developments.

( ) 9. A person thoroughly trained in the principles of Audio-Visual Aids has been appointed as coordinator.

( ) 10. In-service training is provided to instructors and students on the operation and care of equipment by the coordinator.

( ) 11. Courses in the latest developments in the field of audio-visual aids is given to the staff periodically by the coordinator.

( ) 12. The coordinator assists instructors in the preparation of audio-visual aids materials.

( ) 13. The coordinator maintains a list of audio-visual aids available to instructors, other than those available in the school, which gives the source and availability.

( ) 14. The coordinator is responsible for securing audio-visual aids for instructors and has published a plan and procedure for securing such aids.

( ) 15. The coordinator maintains an accurate inventory of all audio-visual aids and their location and assignment at all times.

( ) 16. The coordinator is a member of the area visual aids society and keeps abreast of latest developments by his attendance at conferences, work shops, seminars, etc.

( ) 17. Equipment, supplies, facilities, and personnel are available for the preparation of audio-visual instructional materials.

Equipment

Schools designed for technical education require well-equipped laboratories and shops designed to develop the technical skills and manipulative skills required by technicians to meet the needs of industry. Modern physics and chemistry laboratories are needed to teach the basic sciences. Specialized laboratories in materials, electronics, metallurgy, and other technologies included in the curricula are required to supplement theory taught in the classroom and to develop skill in measurement, obtaining and interpreting data, circuitry, systems analyses, preparation of reports, and use of modern laboratory equipment and instrumentation.

Laboratory shops with modern equipment are needed to develop safety habits and good work habits and attitudes. Here also students learn about materials, production methods, time study, quality control, and tool characteristics.

Laboratory and shop equipment should be modern and similar, in most cases identical, to the kind and type which the student will encounter on-the-job in a new, modern plant. It should be borne in mind that school equipment is not readily replaced. Therefore, the very latest models should be purchased so that obsolescence because of technological developments may be warded off as long as possible. The principle also applies to plant and grounds maintenance equipment.

The modern school also requires a multitude of instructional equipment including typewriters and copy reproducers for faculty as well as for office use, audio-visual equipment including closed-circuit television units, and microfilming and viewing apparatus.

Evaluation should determine if sufficient equipment is on hand to meet the needs of the particular area or function. In this respect, generally, laboratory shops should have work stations for each student, and laboratories for groups of twos. There should be a large variety of equipment in good working condition, of good quality, and showing evidence that it is being used. There should be a preventive maintenance schedule which is followed and indications that safety is stressed. A working policy should exist for amortization of equipment and for replacement of obsolete units.

Laboratory

Check List

( ) 1. Staff work areas are well equipped for the activities for which the areas are being used.

( ) 2. Equipment is of good quality.

( ) 3. Laboratory equipment is available in sufficient variety and quantity to permit flexibility in laboratory assignments and project work.

( ) 4. Instrumentation is of high quality and good variety similar to that found in industrial laboratories and test areas.

( ) 5. Equipment is designed to permit a minimum of set-up time.

( ) 6. Laboratory equipment in the technical areas is similar to that found in industrial laboratories and test laboratories.

( ) 7. There is evidence of the ingenuity of instructors and the students in adapting apparatus to teaching and learning needs.

( ) 8. Mock-ups, demonstrators, and simulators are in evidence for teaching various concepts, principles, processes, and interrelations in systems.

( ) 9. A large variety of equipment parts and apparatus is available for study and experimentation.

( ) 10. Equipment shows evidence of careful use and good maintenance.

( ) 11. First-aid kits are in evidence in the laboratories and are well stocked.

( ) 12. Hazardous and dangerous equipment is well identified and adequate protection and instructions for personnel provided.

Facilities

Modern educational programs require school plants which are designed as integral parts of the programs. It is no longer adequate to think of the plant as the "School house." The school plant, consisting of the site, buildings, equipment, and services, is now a major factor in the functioning of a good educational program. During school time the plant is the physical environment which assists or limits student achievement of desirable learning experiences.

For a technical education program, some guiding principles for evaluation of the school plant are:

a. The school plant should provide the physical facilities to conduct a program designed to meet the general education and technical education needs of the learners, both young people and adults.

b. The plant should provide water, heat and ventilation, illumination, electric power, and sanitation services which contribute to the educational plan and the health of its occupants.

c. The plant should be designed, equipped, and maintained so as to minimize the possibility of accidents and fires involving the occupants.

d. The interior of the buildings should be designed to provide flexibility in utilization. Changing education patterns require multiple use design.

e. The site should be, and continue to be for the foreseeable future, satisfactory for educational purposes and should allow for expansion of its educational facilities when the need arises. The planning of the building should take advantage of important site features.

f. The interior and exterior of the buildings should be attractive and appropriate in design so that esthetic quality is evident. The grounds about the buildings should be well-kept and include lawns, shrubbery, adequate parking facilities, and lighting.

g. The school plant should be an integral part of the community planning program. The entire plant should stimulate the students and the community to use its educational facilities effectively.

Plant

Check List

( ) 1. The school is readily accessible to the students within the proposed center of the population to be served.

( ) 2. The school is accessible to public transportation lines and easily reached by good highways, hard-surfaced roads and walks, and is free from traffic dangers.

( ) 3. The site is adequate for foreseeable future expansion.

( ) 4. There is ample space for good outdoor athletic programs.

( ) 5. The buildings are designed and placed so as to permit future expansion.

( ) 6. There is room for ample parking areas.

( ) 7. The plant has the necessary utilities: electricity, gas, water, fire protection, telephone services, sewage disposal, etc.

( ) 8. The interior and exterior of the buildings are well-kept and in good repair.

( ) 9. The grounds about the buildings are well-kept and include lawns, trees, and shrubbery.

( ) 10. The plant is remote from places having undesirable influences on youth.

( ) 11. The use and value of the school is not impaired by industrial smoke, obnoxious odors, noises, dust, or other hazards.

( ) 12. Space for loading and unloading buses, space for walks and driveways including front entrance driveway, service entrance driveways, and walks to all entrances has been provided.

( ) 13. Provisions exist for storage of school's own vehicles.

( ) 14. Acoustics, heating, ventilation, and air-conditioning (if required) are adequate to maintain a healthful climate conducive to study and to the other activities conducted in the buildings.

( ) 15. The exterior and interior plan, design, and materials facilitate maintenance at low cost.

( ) 16. The buildings are kept clean, well-painted, and in good repair inside and out.

( ) 17. There is evidence of good housekeeping throughout the premises.

( ) 18. The lawns, walks, drives, landscaping, etc., are well maintained and in good repair.

( ) 19. The fire alarm system provides for positive alarm from suitably convenient stations.

( ) 20. The fire alarm system is connected to the municipal system, with cut-off for tests and drills.

( ) 21. There is an adequate and well-functioning clock and program signal system.

( ) 22. Adequate telephone services are provided for staff, student, and public use.

( ) 23. Public address and audio-visual systems, including regular and closed circuit television, are available and provide adequately for a large variety of teaching situations.

( ) 24. Provisions have been made for storage of student apparel and belongings.

( ) 25. Facilities are available in classrooms, demonstration rooms, and laboratories, or adjacent to these areas, for accommodating wearing apparel, etc., of part-time and evening school students.

Administration and Staff

Check List

( ) 1. Adequately furnished, lighted, equipped, and private office space is provided for the administrative staff.

( ) 2. Adequately furnished, lighted, equipped, and staffed secretarial and clerical offices are in close proximity to the administrative staff offices.

( ) 3. Conference rooms are available for individual and group conferences and testing.

( ) 4. Adequate storage space is available for storage of office supplies and materials.

( ) 5. Adequate storage space and equipment and a vault are available for storage of records.

( ) 6. Adequately furnished, lighted, and equipped office and study space is available for the instructors.

( ) 7. Comfortable lounging areas are available to the staff.

( ) 8. Spacious and well-equipped work and preparation areas are available for laboratory instructors.

( ) 9. Large, well-equipped room (or rooms) is available to staff for preparation of instructional materials.

( ) 10. Adequate storage and filing facilities are provided in staff offices, work areas, and classrooms.

Classrooms

Check List

( ) 1. Classrooms and lecture-demonstration rooms provide sufficient space for size of groups utilizing these facilities.

( ) 2. The design of at least some classrooms is flexible permitting expansion or subdivision of space as may be required.

( ) 3. The rooms have sufficient blackboard and bulletin board space.

( ) 4. The rooms have the services required for operation of a variety of audio-visual and demonstration equipment.

( ) 5. Classroom furniture may be arranged to meet needs of a variety of instructional methods.

( ) 6. Sufficient classroom furniture is available to accommodate groups using the areas.

( ) 7. The rooms contain adequate storage space and facilities for storage of supplies, materials, and equipment.

( ) 8. There are an adequate number of classroom areas to allow flexibility in scheduling.

Laboratories

Check List

( ) 1. There are laboratories available for all courses requiring laboratory experiences.

( ) 2. Some classrooms are available near the laboratories.

( ) 3. Adequate storage space and facilities are available in or adjacent to each laboratory for storage of supplies, materials, and equipment.

( ) 4. Adequate work and preparation areas are available in or adjacent to the laboratories.

( ) 5. Provisions are made for reference books and materials in or adjacent to each laboratory.

( ) 6. Laboratory layout and design permit flexibility and a large variety of experimental set-ups.

( ) 7. Laboratory furniture, benches, cabinets, etc., are designed to permit storage of materials, supplies, and equipment close to the work areas so as to minimize set-up time.

( ) 8. Laboratories have the utilities and services required for experimentation, and these are in sufficient quantities to provide flexibility in operation.

( ) 9. Closed-circuit TV circuits for reception and transmission are available in the laboratories, with provisions for communication between the laboratories and other classrooms.

( ) 10. Sufficient blackboard and bulletin board space is available in the laboratories.

Co-Curricular Services

In the broad sense, the curriculum includes more than the course of study. It includes the functional body of materials and experiences designed to promote the growth of the student. Hence an evaluation of the instructional program should include also such areas as the student personnel services, the school library, the health services, and the student activities program.

Student Personnel Services

Student personnel services are an indispensable part of the co-curricular services offered by the school. These services extend considerably beyond the usual guidance and counseling services. They touch on all phases of the student's life--social, financial, home and family, mental health, study habits, and all the other factors contributing to his life adjustment. It is recognized that a student burdened with troubles, real or imaginary, cannot perform adequately and is a potential dropout.

Evaluation of these services should supply information with regard to such factors as:

1. Organization of the Student Personnel Services
    - a. How extensive are the provisions for these services?
    - b. How adequate is the concept of these services held by the faculty members?

c. To what extent is the services' personnel involved in non-services activities?

2. Services Personnel

   a. How adequate is the membership of the Student Personnel Services?

   b. Are provisions made for special services, such as a psychologist, a social worker?

   c. Does the personnel have the required professional preparation and qualifications?

3. Services

   a. What student personnel services are available?

   b. How extensively are these services used?

   c. How adequately are the services meeting needs?

Organization

Check List

( ) 1. The school has an effective plan for providing all student personnel services.

( ) 2. There is a properly qualified person employed full-time as head of student personnel services.

( ) 3. The administration and faculty participate as a team in student personnel services.

( ) 4. There are sufficient facilities and equipment available for the student personnel office.

( ) 5. There is sufficient clerical assistance provided.

( ) 6. All students as well as the staff are aware of the services provided.

( ) 7. A student handbook describing the services is available and is distributed to all students.

Selection and Admissions

Check List

( ) 1. There is a sound policy on selection and admission of students well correlated with the educational program and school objectives.

( ) 2. Entrance examinations and placement tests are administered to all applicants.

( ) 3. High school records, college boards scores, personal interviews, rank in secondary school class, as well as results of standardized entrance test, are considered as a basis for admission.

( ) 4. The school has a policy for accepting students on "condition."

( ) 5. The school has a policy for accepting transfer students.

( ) 6. Complete records of those accepted and those denied admission, including profiles, are maintained.

( ) 7. The school has a policy for accepting credits earned in extension courses, summer sessions, courses taken at other institutions, or by correspondence.

( ) 8. The school has close relationships with its sending schools and makes scheduled visits for the purpose of recruitment.

( ) 9. The school participates in college career days of secondary schools.

( ) 10. The school invites guidance counselors of secondary schools to visit the school as a group.

( ) 11. The school enlists the services of present students and graduates to speak to prospective students during visits to secondary schools.

( ) 12. The school publishes up-to-date catalogs and literature of its program.

( ) 13. The school encourages visitation to the school by prospective students, parents, guidance counselors, service clubs, and professional societies.

( ) 14. The student personnel office maintains a list of scholarships and loans available to students.

Guidance and Counseling

Check List

The Counselor:

( ) 1. Is a qualified person trained in guidance and counseling and meets certification standards.

( ) 2. Schedules sufficient time for student counseling.

( ) 3. Prepares for each interview by studying all data pertinent.

( ) 4. Conducts all interviews in private and is professional in handling confidential information.

( ) 5. Encourages freedom of expression during the counseling interview and avoids dominating the conversation.

( ) 6. Handles discipline except in case when adjustment problems are involved.

( ) 7. Cooperates with the staff in promotion of counseling activities.

( ) 8. Makes provision for follow-up interviews when warranted.

( ) 9. Attempts to counsel early school leavers.

( ) 10. Is thoroughly acquainted with referral agencies and refers individuals when assistance is needed.

( ) 11. Maintains current significant information about each student on a CR card (Cumulative Record).

( ) 12. Insures the accuracy, validity, and appropriateness of all information.

( ) 13. Notes referrals and interviews on the CR card.

( ) 14. Insures that information contained in the student record is considered confidential.

( ) 15. Makes available pertinent data which will assist in understanding a student's problem.

( ) 16. Maintains individual folders in addition to the cumulative record.

( ) 17. Has available sufficient funds to operate the testing program.

( ) 18. Has available special purpose tests for counseling individual cases.

( ) 19. Has suitable physical facilities necessary for the testing program.

( ) 20. Bases test selection on careful review of the most recent related research in the area.

Occupational Information and Placement

Check List

Personnel responsible for occupational information and placement:

( ) 1. Provide career information to assist students make valid vocational and educational choices.

( ) 2. Have available facilities for displaying occupational literature.

( ) 3. Accumulate information relative to industry in general and occupations for which the school trains in particular.

( ) 4. Assist students who withdraw from school to obtain additional education or training.

( ) 5. Collaborate with the department heads in the placement of graduates in full-time employment.

( ) 6. Assist students in obtaining part-time employment.

( ) 7. Cooperate with the state employment service in registering students for possible placement.

( ) 8. Cooperate and coordinate with industry in arranging a schedule for recruitment by industry and provide a suitable interviewing room for recruiters.

( ) 9. Recommend changes in placement of students for better adjustment within the school.

( ) 10. Conduct orientation meetings concerning opportunities with the Armed Forces, industry, and future educational possibilities.

( ) 11. Provide scholarship and loan information for interested students.

( ) 12. Have a complete file of latest four-year engineering college catalogs.

( ) 13. Forward transcripts promptly when requested.

Follow-Up

Check List

The Student Personnel Services Office:

( ) 1. Compiles a graduate survey of each graduate class.

( ) 2. Compiles a five-year and ten-year graduate follow-up survey.

( ) 3. Performs "exit interview" of dropouts.

( ) 4. Conducts research pertaining to students and graduates.

( ) 5. Maintains active contacts with alumni through the alumni association.

School Library

The school library should be a center of learning and research. It should be staffed with trained personnel and assistants adequate in number to serve the school. It should be centrally located and easily accessible to all students and provide an environment conducive to study, reflection, and research. In addition, the library should:

1. Provide materials that will enrich and support the curriculum of the school, taking into consideration the varied interests, abilities, and maturity levels of the students.
2. Provide materials that will stimulate growth in factual knowledge, literary appreciation, esthetic values, and ethical standards.
3. Provide materials on opposing sides of controversial issues so that young people may develop, under guidance, the practice of critical reading and thinking.
4. Provide a background of information which will enable students to make intelligent judgments in their daily lives.
5. Provide materials representative of the many religious, ethnic, and cultural groups and their contribution to our American heritage.
6. Place principle above personal opinion and reason above prejudice in the selection of materials of the highest quality in order to assure a comprehensive collection appropriate to the function of the library.

Library Services

Check List

( ) 1. The library employs a full-time librarian, fully certified and qualified.

( ) 2. The librarian has sufficient clerical and professional assistance.

( ) 3. The faculty have a voice on library policies and procedures.

( ) 4. The instructional program is geared to the maximum use of the library.

( ) 5. The library is available to students at times other than the usual school hours.

( ) 6. There are adequate funds appropriated each year to the library for the purchase of equipment, books, magazines, and periodicals.

( ) 7. The library has the proper distribution of volumes with respect to fiction, non-fiction, engineering and related chemistry, mathematics, and physics.

( ) 8. The library subscribes to current magazines (technical and non-technical periodicals and newspapers).

( ) 9. The library utilizes all sources of funds available from federal, state, and local grants.

( ) 10. The seating capacity is adequate for student needs.

( ) 11. The librarian has an adequate workroom and storage area.

( ) 12. All books are catalogued in accordance with standard practices, and the card file is kept up-to-date.

( ) 13. Circulation statistics are kept and used to interpret library usages and needs.

( ) 14. A section of the library is reserved for the professional improvement of the staff.

( ) 15. A pamphlet file, properly catalogued, is maintained containing topics of interest and use to the students and staff.

( ) 16. Reference materials are kept up-to-date.

Facilities and Equipment

Check List

( ) 1. The library is centrally located and easily accessible to all students.

( ) 2. Seating capacity and tables are adequate. (Seating for at least 40 to 45 students or 7% of enrollment.)

( ) 3. A conference room and separate work room are provided.

( ) 4. The work room has a sink and running water.

( ) 5. The work room has sufficient storage facilities.

( ) 6. A section of the library is reserved for the professional improvement of the staff.

( ) 7. The library is adequately lighted and ventilated.

The following general equipment needs are adequate:

( ) 8. Adjustable shelving

( ) 9. Magazine shelving

( ) 10. Newspaper rack

( ) 11. Charging desk and chair

( ) 12. Dictionary stand and unabridged dictionary

( ) 13. Atlas stand

( ) 14. Card catalogue case

( ) 15. Vertical-file cabinets

( ) 16. Bulletin boards

( ) 17. Display case

( ) 18. Book trucks

( ) 19. Librarian's desk and chair

( ) 20. Typewriter and stand

( ) 21. Step stools or shelf ladders

( ) 22. Book repair materials and equipment

( ) 23. Floor covering attractive, hygienic, and sound absorbing

Library Materials

Check List

( ) 1. The book collection reflects every area of the school curriculum--trade, related, and general education.

( ) 2. Materials for the cultural growth of the students are provided.

( ) 3. Materials that supplement the texts, but offering more breadth and variety, are provided.

( ) 4. Differentiation is made in the selection of books for different levels of reading ability.

( ) 5. Materials include information and assistance in all areas of learning which affect young people.

( ) 6. Books are provided that assist growing youth in the solution of their personal problems in home, family living, and social adjustments.

( ) 7. Reading materials are provided for the recreational leisure time interests of the students.

( ) 8. Materials are provided and kept up-to-date for the professional improvement of the staff.

( ) 9. Periodicals pertaining to the various trade areas are provided.

( ) 10. Daily newspapers are provided.

( ) 11. Periodicals are provided which reflect various areas of the general curriculum, world scene, and other items of general interest.

( ) 12. A pamphlet file, properly catalogued, is maintained containing topics of interest and use to the students and staff.

( ) 13. Books are catalogued according to the Dewey Decimal System, and the card file is kept up-to-date.

( ) 14. Encyclopedias and other essential references are replaced every two years.

( ) 15. Multiple copies of material in heavy circulation are maintained.

( ) 16. Circulation statistics are kept and used to interpret library usage and needs.

Library Program

Check List

( ) 1. Classes are conducted for the students, in cooperation with the English department, in the use of the library facilities.

( ) 2. Provision is made to acquaint the staff and students with new materials acquired by the library.

( ) 3. Students and faculty are made aware of the availability of materials that supplement and enrich the school curriculum.

( ) 4. Bulletin boards are changed often and kept up-to-date.

( ) 5. Display cabinets are maintained and changed often.

( ) 6. The library program provides materials to supplement and enrich the school curriculum, stimulate growth, and encourage literary appreciation and ethical standards.

( ) 7. The library assists instructors in the enrichment of their areas by providing professional as well as subject content materials.

( ) 8. Books that are used in group work and special class projects are put on reserve.

( ) 9. The library assists in the reading improvement program of the school.

( ) 10. Pupils are encouraged to use the library for leisure reading as well as for required work.

( ) 11. Library hours are such that all students have ample opportunity to avail themselves of its services.

( ) 12. A book fair or similar activity is held annually to encourage interest in reading.

( ) 13. Provision is made to obtain books, on loan, from other libraries.

( ) 14. The library is recognized as an essential segment of the instructional program.

Health Services

Health services activities should be carried out so as to increase the student's understanding of health, to develop favorable attitudes toward health, and to produce more desirable health practices. These functions require the coordinated efforts of the school staff as well as those of the physicians, dentists, nurses, and students to meet specific objectives such as:

1. To review the health status of all students.
2. To counsel students, parents, and staff personnel in health matters.
3. To recommend correction of remediable defects.
4. To provide first aid treatment and to see that serious cases are referred for appropriate attention.
5. To inculcate good safety habits by education of a formal and informal nature.
6. To inculcate good health habits by education of a formal and informal nature.
7. To provide care for students who are ill while at school and those who return to school after illness.

Evaluation of the health services should show how well the desired objectives are being met and indicate the best elements of the health services, the least adequate elements, and what improvements should be made.

Organization

Organization for school health services will vary according to the size of the school, available resources in personnel and equipment, and administrative provisions.

Check List

( ) 1. In-service provisions are made for teachers to review their duties and responsibilities with respect to health services.

( ) 2. The functions and responsibilities of teachers, administrators, and other staff personnel with respect to health services are clearly defined and understood.

( ) 3. Appropriate programs are cooperatively planned for students who have had severe illnesses or who are otherwise physically handicapped.

( ) 4. School health services include appraisal of the health of school personnel.

( ) 5. Letters are sent to parents concerning physical defects of students.

( ) 6. School health services offer assistance in the identification and education of handicapped students.

( ) 7. Provisions exist for the identification and treatment of emotionally disturbed students.

( ) 8. Good health and safety habits are stressed throughout the school.

Health Appraisal

Appraisal procedures identify students who have health needs or handicaps that necessitate adaptation of the school program.

Check List

( ) 1. Physical examinations are required of all new students.

( ) 2. Physical examinations are required of all new employees.

( ) 3. The school medical advisor inspects monthly the kitchen, dining area, shower rooms, and medical examination room.

( ) 4. Physical examinations are provided by the school physician for Varsity and Junior-Varsity teams.

( ) 5. Vision tests are given to all new students.

( ) 6. Color blindness tests are given to all freshmen and other new students.

( ) 7. Hearing tests are given to new students and to others when the need is indicated.

Emergency Care

Planned procedures to provide emergency care (first aid) for students who become ill or injured at school are an important part of school health services.

Check List

( ) 1. School first aid kits are maintained in laboratories, laboratory shops, medical examination room, and school vehicles.

( ) 2. Health records are accurately maintained on each student.

( ) 3. First aid supplies are on hand in the medical supply area.

( ) 4. There is a written plan to handle emergencies that occur in the absence of the school nurse and medical advisor.

( ) 5. All staff members have a copy of the emergency plan.

( ) 6. There is an active school health and safety council.

( ) 7. There is an eye protection program in operation.

( ) 8. All major accidents are reported within forty-eight hours to a designated person on specified forms.

( ) 9. There are planned procedures for periodic evaluation of the school health services.

( ) 10. There are written standing orders prescribed by the school physician or the school nurse.

( ) 11. Provisions exist for the emergency care of all students and school personnel.

Co-Curricula Activities

No school can expect to maintain student interest in the usual curriculum program unless it balances this side of its offering with a less formal, more relaxing group of student activities usually regarded as extra-curricular or co-curricular.

Schools often feel that the heart of their program, the course of study, comes first, and if there is any time or interest left, a program of student activities should be organized. The student activity program should not be left to chance. It should be an integral part of the educational experience provided by the school. It is probably the best method for developing desirable social traits, good fellowship and sportsmanship, and the ability to participate in the democratic processes.

The student activity program should provide activities to meet the needs and interests of all students, with membership in groups open to all. Faculty members should understand the purposes of the co-curricular program, the contributions it can make to the education of young people, and they should participate in and cooperate with the program. Evaluation of this program will provide data for assessing the overall effectiveness of the co-curricular program of the school.

Check List

( ) 1. The school encourages extra-curricula activities which will meet the cultural, social, and physical needs of the students.

( ) 2. The school has an active student council which operates with academic freedom and has a voice in student activities.

( ) 3. The school actively promotes student organizations such as student chapters of professional societies, honor society, service club organizations, hobby clubs, school newspaper, school band, school orchestra, yearbook, etc.

( ) 4. The school encourages and promotes talks, lectures, and demonstrations on technical matters given by outstanding individuals.

( ) 5. The school encourages and promotes talks, lectures, exhibits, and programs on non-technical matters given by outstanding individuals in drama, music, art, current events, etc.

( ) 6. The school promotes interscholastic and intermural athletics.

( ) 7. The school encourages and promotes social programs.

( ) 8. Competent and interested faculty advisors are provided for all clubs.

( ) 9. Student funds are maintained in accordance with existing regulations.

( ) 10. Student financial reports are periodically posted or published.

( ) 11. Audits of student funds are periodically made in accordance with existing regulations.

( ) 12. Student dues are not too excessive.

Summary

An evaluation of an institution offering programs in technical education is concerned with the quality of performance as measured by various evaluative devices and with the improvement of that performance.

Evaluation must be a democratic process. All personnel affected should be involved in cooperatively developing and applying the evaluative criteria, procedures, and materials. Evaluation should be based on progress rather than preconceived standards. Evaluation should lead to the identification of next steps to be taken toward improvement of the total school program. It is of utmost importance that these steps be taken.

Evaluation is of vital concern to administration, and the administrative staff must provide the democratic leadership required in the evaluation process.

No evaluation can succeed without the full cooperation of the faculty. As professional people, teachers want to do a good job and to improve. Evaluation will aid teachers in identifying weaknesses and strong points in the program and in rethinking objectives and determining their success toward achieving these goals. It will motivate growth and change and may point out new goals and new paths for reaching them. Teachers will support evaluation if they are involved in the total process.

Evaluation should be continuous, with evaluation of several aspects of the program in process at all times and evaluation of the total program at intervals of several years.

The check lists included in this paper, although extensive, are not all-inclusive. Some items may not be necessary or even applicable in every school, while other important features or procedures may have been omitted. The lists are provided only as guides for the development of similar lists appropriate for the particular school system or institution.

Accreditation by a state, regional, or professional agency certifies to the fact that the institution meets the educational and professional standards promulgated by the agency. New federal legislation providing funds for technical education requires accreditation of an institution by a recognized accrediting agency if the institution wishes to participate in the program. This legislation will have a salutary effect on technical education programs, particularly in states where accreditation is not required at present.

Accreditation of an institution requires an evaluation of that school. Perhaps the greatest benefits which will come from accreditation are those which are derived from the evaluation.

PART III

FACILITIES

FACILITIES PLANNING FOR TECHNICAL EDUCATION PROGRAMS

by

Milton E. Larson*

Introduction

Projected construction of 1,872 new area vocational schools between 1966 and 1975, as reported in a recent survey of our 50 states, indicates the urgent need for new facilities for technical education! These facilities will cost approximately $1.5 billion and will serve an additional 2.9 million youths and adults in vocational and technical education (Chase, 1966). During fiscal 1965, 208 area vocational education schools were built or remodeled at a total cost of $101,845,074, bringing the total number of such facilities to 651. At the end of fiscal 1966, the number had increased to 756 (Miller, 1966).

In the past decade, technicians have become one of the fastest growing occupational groups in the nation. Increasing numbers have been needed to staff expanding programs. New technologies have emerged to create clusters of new occupations.

The Panel (of Consultants' Report) noted that by 1970 the American labor force will total 100 million people (U. S. Office of Education, 1964). While the ratio of 0.91 technician to one engineer expresses the present average, the gap is gradually closing. A much more desirable ratio would be an average of 2.0 technicians to one engineer.

The technician has been described as a person who works at a job which requires applied technical knowledge and applied technical skill. His work, in this respect, is somewhat akin to that of the engineer, but usually the scope is narrower. His job also requires some manipulative skills--those necessary to handle properly the tools and instruments needed to perform the technical tasks (Emerson, 1958).

Even though "accommodation," "flexibility," and "adaptability" are key words in facilities planning today, the most important single consideration is still the program which the facility will house. Consideration of needs of the program should be followed by the needs of students, then the needs of faculty and other personnel.

A study must be made of the space requirements of classrooms, laboratories, shops, and auxiliary spaces needed to carry out effectively the instructional program.

Planners of technical education facilities will profit by reading again the statement of John W. Gardner, "The society which scorns excellence in plumbing because plumbing is a humble activity and tolerates shoddiness in philosophy because it is an exalted activity will have neither good plumbing nor good philosophy. Neither its pipes nor its theories will hold water" (Gardner, 1958).

---

*Dr. Larson is Professor, Department of Vocational Education, Colorado State University.

Facilities teach! The environment for learning adds or detracts from the learning experience. Students of architecture have long recognized that a close relationship exists between the physical environment and the teaching-learning process. Charles William Brubaker and Lawrence B. Perkins expressed this well when they wrote, "...as architects we have been given difficult jobs, but the toughest problem yet is to design space to stimulate individual learning" (Brubaker, 1959).

Procedures for Planning Facilities

Facilities planning is closely related to program planning. While the course content of technical programs varies from state to state, institution to institution, and whether on the high school or post-high school level, all planning needs to be based on present program needs with concern for the future. The ability of the planners to project the program needs will determine the adequacy of the facility for programs of the future, many of which may not now exist. Mistakes made in planning--failures to anticipate future needs or to construct the facility so that it can be readily adapted to future needs--result in educational facilities that stand as monuments of masonry and steel to incompetent and inadequate planning.

Technical Education Curricula

The Wisconsin State Board of Vocational, Technical, and Adult Education recommends for a technical education post-high school two-year associate degree program a curriculum of 68 semester hours with the following emphasis (Greiber, 1964): Technical Courses 43 percent, Mathematics 13 percent, Related Technical 13 percent, Science 9 percent, and General Education 22 percent. Analysis of the curriculum content distribution of other selected programs of technical education is shown in Table I (Report of the National Leadership Development Institute in Technical Education, Rutgers - The State University, 1966).

Translation of program into space requirements needs to consider the relative amounts of space required to serve the needs of each of the divisions represented by the curricula.

Projections of Needs for Future Programs

The needs for an educational program can be assessed in terms of national needs, state or regional needs, and local needs. Local needs can be viewed from two different perspectives: the needs of local youths and adults for the education and the needs of local industry and business for competent workers. National and state needs for semiprofessional and

TABLE I

CURRICULUM CONTENT DISTRIBUTION OF SELECTED TECHNICAL PROGRAMS

Curriculum	(In Percent) Technology	Mathematics	Science	Drawing	General Education
Engineers' Council for Professional Development (Sample curriculum-1962)	45.9	16.7	8.3	8.3	20.8
Wausau Technical Institute (Mechanical Design-1965)	40.6	9.4	9.4	17.2	23.4
Purdue University (Mechanical Technology-1966)	45.3	15.7	11.4	4.3	27.1
Iowa State University (Mechanical Technology-1966)	48.2	13.9	11.1	10.2	16.6
USOE Bulletin OE-80015 (Suggested curriculum-1962)	49.2	12.9	12.7	9.9	15.5
Oklahoma State University (Metals Technology-1966)	55.9	7.3	11.8	10.3	14.7
Broome Technical Community College (Mechanical Technology-1966)	56.5	9.3	14.8	2.8	16.6
Richland Technical Education Center (Mechanical Technology-1965)	71.5	10.9	5.9	2.9	8.8

technical personnel can usually be assessed from manpower studies by the U. S. Department of Labor, the National Science Foundation, the U. S. Office of Education, and the United States Chamber of Commerce, as well as from reports of state agencies and special studies.

The community occupational survey may be approached from two directions: first, the "team of experts" approach; and second, the "citizen participation" method. A management consultant firm or consultant from a university may be employed to study the community's economic life, collect complete information on the labor force, and make projections (Harris, 1964).

In a "citizens' participation" study, the emphasis is placed on the participation of citizens representative of all segments of the community.

With the guidance of an experienced survey director, and specialists as needed, the desired data can be secured. In addition, the direct involvement of a large number of citizens of the community provides a strong public relations medium.

In conducting an area study, the following steps need to be taken (Establishing and Operating Area Vocational-Technical Education Programs in Michigan, 1966):

- Enlist the support of educators in the area.
- Consult with the Vocational Education Division of the State Department of Education.
- Determine sponsorship of the study.
- Determine a source of dependable revenue for adequately financing the study.
- Develop a study proposal designed to determine:

  What technical education programs are needed at both the high school and post-high school levels.

  Where these programs should be located.

  How these programs will be financed.
- Submit the proposal to the Division of Vocational Education, Department of Education.
- Officially appoint citizen members of the study.
- Secure consultant assistance.
- Employ a study director.
- Complete the study and publish the results.

If a sampling design is developed for the community survey, it is necessary to use a random sampling technique. Employing a stratified random sampling technique and thus treating each segment of the employment community separately is advantageous. The size of the sample is identified after carefully determining the specific objectives and goals of the study. Frequently a sample size from 54-68 percent of universe is employed; however, excellent results have been secured with much smaller samples.

Steps to be Taken by the Board of Education in Planning Facilities

- Arrange for a school citizen's study.

o Consider the findings within the citizen's report and determine a course of action.

o Acquire the services of competent consultants.

o Visit other communities for the purpose of observing new school facilities.

o Select a qualified registered architect.

o With the aid of the citizen study committee recommendations, develop educational specifications for the architect. The administration, teaching and non-teaching staff, pupils, and citizen committee should be given joint responsibility in this step.

o Select site or sites. In doing this, consideration should be given to the survey recommendation and to the opinions of the architect.

o Arrange for the preliminary drawings and specifications, together with an estimate of the costs.

o Plan the publicity program. Here the various local planning committees should be used to as great advantage as possible.

o Have the architect submit preliminary plans and cost estimates to the board of education for consideration and approval.

o Determine the financial program to be followed. Estimate the funds needed for the actual construction, equipment, and landscaping. Set up a financial plan which includes the bond program, voting funds, sale of bonds, bond redemption program, insurance, and other liabilities.

o Select a date for a special election to approve the bond issue.

o Following a favorable election, instruct the architect to proceed with the final drawings and specifications. Set a target date for their completion.

o Approve the final drawings and specifications. Members of the study committee and other educational specialists may be utilized in the final review of plans--prior to board acceptance.

o With the guidance of the architect, call for bids on construction and equipment. A specified date must be set for receiving bids.

- Let contracts following final review of all bids.

- With the aid of the architect and legal adviser, prepare and execute contracts, time schedules, payments, and performance and surety bonds.

- Begin actual construction of the building.

- Select furniture and equipment; install as construction conditions permit.

- Clean school building and site. All landscaping and plantings should be completed previous to occupancy.

- When construction of the building is completed, have it inspected. This should involve the administration, board of education, architect, and contractors.

- Arrange for the school staff and student body to be instructed in the use and operation of the building. This phase of the program deserves increased attention if the features of a modern plant are to be fully utilized and enjoyed.

- Have the building formally dedicated and presented to the public. This is a magnificent opportunity for a public relations effort to boost better technical education.

Administrative Responsibilities in Planning Technical Education Facilities

- To conduct and direct research that will determine the relationship of new buildings to a forward looking technical education program to meet the changing needs of our dynamic technology. To interpret such findings to the board of education, the staff, and the community.

- To furnish pertinent facts in guiding the policy formation of the board in its many basic decisions in school plant planning.

- To establish and maintain, for each building project, a chronological schedule and record of all decisions, transactions, and steps taken from its inception by the board to the dedication of the building.

- To secure cooperative planning of the principals, teachers, and community in developing the total building program and in the immediate planning of the technical education plant.

- To convey to architects and other specialists a clearly stated program to be implemented by the building.

- To consult with the architects and other specialists on the interpretations of the program and on the educational evaluation of proposed solutions to the problems presented.
- To assist the board of education in preparing an effective presentation of the building program to the community and in developing a financial plan for servicing the building program.
- To develop plans for the maximum utilization and preservation of the building by the staff and the community.
- To translate all planning for all facilities into a creative and constructive program of technical education.

Advisory Committees

The services of advisory committees are important in planning facilities for technical education. Whether the "team of experts" approach or the "citizen participation" method of planning is employed, the role of an advisory committee is significant. However, under the "citizen participation" method, much broader and more extensive use is made of such a committee. The committee may consist of a large number of individuals representing at least three major groups: First, the users of the school and its financial supporters; second, professional and technical consultative residents willing to assist in an advisory capacity in the building program; and third, commercial representatives (NCSC Guide for Planning School Plant, 1964). Frequently a general advisory committee is established with several subcommittees relating to special problems as: enrollment; site selection; educational specifications; finances and funding; public information; etc. Normally the sub-committees are so organized that each will have a representative on the general committee.

> The function of the advisory committee is to give advice. It should be clearly understood that it does not have administrative authority. The committee can and should make recommendations, but the responsibility for action rests with the legally constituted school authoriities... The committee members should be appointed by the school authority... Since advisory committee members serve without pay and are important persons in the community, every effort should be made to make the committee meetings effective (Emerson, 1962).

Five characteristics of a good community approach to determining requirements of facilities through advisory committees include (Strevell and Burke, 1959):

- A working outline is developed in advance in considerable detail as a guide for planning groups.

- The tasks performed by various groups are such as fall within their particular competencies.
- The subgroups report to a central advisory committee.
- The work of building specialists is not necessarily impeded by deliberative processes.
- It is held that interested members of the community, both laymen and teachers, are capable not only of understanding school needs but of having an active share in making the decisions.

Each planning committee must (School Shop Planning, 1959):

- Adopt or formulate a basic philosophy of technical education.
- Know its responsibilities.
- Be flexible.
- Be given enough time to do the job effectively.
- Be structured so that it can profit and grow from its own failures and disagreements.
- Have financial means to obtain expert assistance.
- Analyze needs, problems, and trends in technical education.
- Understand learning and the learner.
- Understand the curriculum and its relation to school facilities.

Guidelines for Long-Range and Master Planning for Technical Education

Determination of guidelines for long-range and master planning must be based on careful analysis of the needs and objectives of technical education. While each institution needs to consider and determine carefully its own goals and objectives, the fundamental purposes of technical education are well established.

Objectives of Technical Education

In the book, Technical Institute (Smith and Lipsett, 1956), the most important objectives were identified as:

- To prepare graduates for occupational competence in a clearly identified technological occupation or cluster of jobs.

- To serve the needs of industry for technical personnel within a geographical area, such as a city, region, or state.

- To provide instruction in the technology of specific industries.

- To serve technical education needs of employed adults.

It is vitally essential that the total program of technical education be "geared" to preparing the graduate to secure a technical position, to have enough technical knowledge and competencies to advance on-the-job, and to have an adequate background in mathematics and science so that he can progress into more advanced courses in his field.

Educational Objectives for the Institution

In determining the educational objectives for the institution, the suggestions of Smith and Lipsett (1956) are helpful. These follow:

- Determine the broad objectives of the institution.

- Survey the demand for one or more curriculums on the part of industry and potential students.

- Select a curricular area which is appropriate in terms of demand, objectives, and institutional facilities.

- Study job requirements in the occupational field selected.

- Allocate each of the required knowledges, skills and understandings to a course of instruction.

- Determine type and amount of general education.

- Plan a balanced and integrated program of study.

Master Plan for Technical Education

Comprehensive, unified state and area planning on a long-range basis is essential if the needs of most of the students within the area are to be effectively served. To avoid "blind spots" where technical education is not available as well as to eliminate unnecessary duplication, a unified effort within the state is highly desirable.

In a recent article, Lynn Emerson (1966) discusses in detail factors to be considered in the preparation of a master plan and the contents of such a plan.

Preparation of master plan.--Dr. Emerson suggests the following as important considerations in the preparation of the master plan:

- The present and potential occupational needs in the labor market area to be served, including trends in the growth or decline of specific occupational fields, the type of expanding industries, the in-migration or out-migration of industry in the state.
- Demographic data including population densities, transportation, population movements interstate and intrastate, and ethnic changes.
- School population trends with respect to numbers, retention rates, continuance into higher education institutions, with projections for a target date.
- Present organizational patterns for technical education (comprehensive high schools, area vocational-technical schools, technical institutes, community colleges); administrative control of these intitutions by local boards, state education departments, or other patterns; relative importance of each type within the state; areas of overlapping or of conflict.
- Present programs of technician education (numbers and types of institutions, curriculum offerings, enrollments, placement of graduates of preemployment programs, extent of evening and other part-time offerings); trends with respect to growth of the institutions.
- Present and potential state legislation affecting technical education.
- Cost data on construction and operation from within present institutions and from other sources.
- Methods of financing capital outlay and operation, present and projected, with respect to share of total carried by the local community, by state and federal funds, and by student tuition.
- Recruitment of teachers and other staff members (available supply, qualifications of present personnel, present and proposed teacher education programs).
- Present and proposed curriculum development services.

Contents of master plan.--In the same article Dr. Emerson discussed the content of the statewide master plan. A master plan for an area school or a local district would need to reflect the same analysis and research but on a more limited basis.

Contained in the outline of such a plan would be the following:

- A basic statement of the philosophy and goals of the state with respect to technical education.
- A brief summary of recent accomplishments in technical education within the state.
- A brief summary of demographic aspects of the state, and directions in which it appears to be moving.
- Present labor market data and projected needs to a selected target date.
- The educational program recommended--any needed changes in the educational administrative pattern; present programs to be continued and changes needed in present programs; new programs required to meet the occupational and population needs; and priorities in the development of new programs.
- Criteria for location of new institutions and programs.
- Fiscal plan for the new developments (capital outlay, operating expense, long-term plan for capital outlay).
- The role of the designated state educational agency in implementation of the plan.
- Miscellaneous items (curriculum development service, uniformity in statewide fiscal and student accounting, teacher qualifications and teacher education, research in technical education).

Long-range planning offers many advantages. Some of these are reflected in the savings resulting from purchasing sites before costs have risen and elimination of much of the waste resulting from building facilities too small or too large for the actual needs, the locating of facilities in wrong places, and the building of facilities obsolete in terms of meeting the needs of future technical education programs (Long-Range Planning, 1962).

Studies for Technical Facilities Development

Appropriate facilities for technical education programs result when adequate time and attention have been given to determination of the specific data supporting the need for such an institution.

Population and enrollment studies.--What is the potential number of students which the school can reasonably expect to serve? Lynn Emerson (1962) found through extensive study in this field "...that in areas of reasonable population density and good transportation facilities, post-high school institutions of the technical institute type might expect to enroll 20 percent of the high school graduates who are not going to college or professional schools." It is a fairly simple matter of determining the number of high school graduates to be served and the average percent of those graduates going on to college and professional schools.

Area and economic studies.--These studies are concerned with the problem of adequate financial support for the school. What is the tax base for a community or area? Is this adequate to support the institution? What other sources of revenue will be available for the school? While this study is mainly concerned with the economic resources of the community, some consideration is given to growth, migration, shifts, composition, and characteristics of the population. Trends in the industrial and commercial development of the community are important. Often much useful information is available through the chamber of commerce and other local organizations involved in the economic aspects of community development.

Area employment studies.--The purpose of these studies is to determine the employment opportunities for graduates of technical education programs. It is highly desirable to ascertain such information as: the total population of the area, percentage of population employed on technician jobs, unmet needs for technicians, stability of the labor force, and similar data. Before engaging in a survey of this type, it is wise to determine if this information is already available. If it is not available, the Bureau of Employment Security can be of tremendous assistance in making a labor availability survey.

Cost estimate of facility.--The cost of facilities for technical education varies with geographic area, type of construction, and nature of the program. Upon the completion of the approval of the preliminary plans by the board of education, the architect will be able to provide a fairly accurate indication of the cost of the plant.

Common modes of expressing costs are in terms of cost per student in full-time attendance or cost per square feet of floor space of new construction. In A Guide for the Establishment of Comprehensive Community Colleges in North Carolina (1963) the per student cost for construction was given at about $2100-$2250 using an average of 140-150 square feet per student with an approximate cost of $15 per square foot. In Education for a Changing World of Work, Appendix I (1963), Lynn Emerson indicates a cost of $3,000 per full-time student in post-secondary technical institutions as a figure to use for estimating. Ellis Rowland (1966), Director Community College Facilities Planning for the State of New York, reported that in the State of New York, the average cost per student is $4,000-$6,000 for 150-180 square feet of floor space. According to a recent article (Edgerton, 1966), the Dodge Building Cost and Specification Digest indicated that during the past several years, the average increase in educational building costs has been 2.8 percent per year.

Sources of funds.--The support of technical education varies in accordance with the kind of institution (comprehensive high school, area vocational-technical school, technical institute, community college). In some states, the major effort is still local while in other states, 100 percent state support is provided. In addition to local and state sources for capital outlay, federal grants and loans may be available to qualified institutions under the Higher Education Facilities Act of 1963, The Applachian Regional Development Program, the Technical Services section of P. L. 815, the Aid to Federally Impacted Areas, and other recent federal legislation.

Bond issues are commonly employed to provide funds for capital outlay. The following factors (Glendenning, Jr., 1966) are important in financial planning:

- Appointment of an administrative coordinator to be in charge of the project.
- Appointment of professional advisors:
  - Architect
  - Legal Counsel
  - Financial Advisor
- Determination of scope of project.
- Application to proper federal and state agencies for the necessary approvals, grants, and loans.
- Preparation of studies to determine financial feasibility.
- Sale of bonds if necessary.

The most important types of surveys as identified in the report Criteria for the Establishment of 2-Year Colleges (Morrison and Martorana, 1960) are:

- Enrollment Survey.
- Financial Support Study.
- Community Interest Survey.
- Unmet Student Needs Study.

- Other significant criteria related to accessibility of the school to students, and also assessed valuation.

Developing Technical Education Specifications

Educational specifications are written outlines of the educational program developed for the purpose of providing vital information to the architect for facilities planning. These specifications are formulated by educators with the assistance of advisory committees and special consultants in program planning, educational media, acoustical environment and other related fields. Involvement of lay groups, occupational advisory groups, and representatives from management and labor as well as students, provides an expanded effort which can be very beneficial in identifying needs and providing vital public information essential to acceptance of the concepts by the community.

Value of Educational Specifications

The advantages of educational specifications are summarized by Chase, Browne, and Russo (1965) in a pamphlet, Basic Planning Guide for Vocational and Technical Education Facilities, as follows:

- Stimulate more effective planning.
- Promote economy in planning the facilities.
- Aid in determining the number and types of rooms and spaces to be provided.
- Serve the architect as a guide for building design.
- Serve the students, faculty, and staff as a guide to utilize the building more effectively.
- Provide for more cooperative planning and understanding of program objectives.
- Emphasize the community's objectives and aims for the technical education program.

Statement of Philosophy and Objectives

The educational specifications need to contain statements of the philosophy underlying the educational program. If such statements have not been formulated, this formulation is one of the functions of the advisory committee working in close cooperation with the administration and the faculty. Specific written statements of the objectives of the educational program are essential. It is helpful to the architect to describe the nature of the activities to be accommodated by the facility as well as the relationship of each activity to the other activities of the institution. The educational specifications for each school must be written specifically for that institution. These specifications must reflect the student characteristics, the nature of the instructional activities, and the objectives of the educational program.

Planning order.--In planning educational specifications, it is usually wise to consider first, educational program; then, student needs; and finally the needs of faculty, staff, and other personnel.

Reflect trends.--The specifications need to be developed to reflect new innovations and methods in the technologies of education, such as team teaching, educational television, computerized instruction, and audio-visual aids. Adaptability, accommodation, and flexibility are key words for planners of educational facilities today. Modular construction, service cavities or columns, light and acoustical control, communications systems, and environmental control are "musts" in most industrial, commercial, and educational facilities reflecting the newest innovations. The common elements of clusters of technical occupations must not be overlooked in facilities planning for technical education. Library-resource centers with study carrels, an audio-visual area, and an individual viewing center are important to learning-teaching activities in technical education. Consideration of multipurpose uses for day and evening school programs will often result in a much higher room utilization factor. The "cigar box" approach resulting from static, load-bearing walls prohibit maximum accommodation and flexibility. Expansion is enhanced by movable partitions and utility columns. Exterior ramps, electronically operated doors, widened doorways, and rest rooms built to accommodate wheel chair traffic now are incorporated into many new technical education facilities reflecting the concern for continued educational opportunities for the handicapped.

Outline of Content of Educational Specifications

Since educational specifications need to be tailor-made to fit the particular needs, considerable variation will result. Several excellent sources of information are available suggesting the content and format for such specifications (Developing Educational Specifications for Vocational and Practical Arts Facilities, 1960; Planning America's School Buildings, 1960, (Nelms, 1965). An excellent statement of the basic requirements are as follows (Guidelines for Realistic Facility Planning for Schools of Vocational, Technical and Adult Education, 1964):

o General requirements

Statement of the philosophy and objectives of the community for its vocational and technical education program.

A plan of the proposed vocational and technical education organization, program, and the groups to be accommodated.

A description of the educational facilities needed.

- o Detailed requirements

  Statement of the philosophy and objectives of each of the subject offerings.

  Space requirements, numbers, and kinds of rooms needed for each subject field.

  Special utilities and service needs in shops and laboratories.

- o Miscellaneous information

  Traffic patterns--interior and exterior.

  Storage.

  Floor materials in shops and laboratories.

  Cleaning systems.

  Intercom, program bell, and clock system (TV, audio-visual, etc.).

  Furniture and equipment to be housed.

  Custodial services.

  Mechanical equipment.

Size and Type of Facility

Standards for offices, laboratories, shops and classrooms will vary from one state to another. In the absence of specific state standards, the following recommendation by the Office of Architecture and Facilities, Community College Services, State University of New York (Rowlands, 1966) is suggested as a guide to space requirements.

Another series of standards frequently employed by consultants in planning the instructional facilities for engineering technology programs is given below. Again, conformance with established standards of space as provided by various State Departments of Education is recommended; however, in the absence of such standards, the following are realistic as a point of departure in beginning planning. Since the requirements of institutions are different, adjustments need to be made on the basis of variations in program and planned maximum enrollments in each space.

TABLE II

SPACE REQUIREMENTS FOR ADMINISTRATIVE OFFICES, LIBRARY, DINING, AND PHYSICAL EDUCATION

Space	Net Area in Square Feet
ADMINISTRATIVE	
President	400
Vice President, Dean of College	300
Other Deans and Directors of Administration	240
Individual secretary or two secretaries	120/each
Three or more secretaries in one area	80/each
Associate Deans or Equivalent	180
Other Administrative Offices	120
Division Chairman	240
LIBRARY	
Total seating and other spaces--based on 33% of total enrollment projected	25/person
DINING AND RELATED SPACES	
Seating based on 35% of total enrollment	
Dining room area, per diner	12/person
Kitchen preparation space, per diner	3.6-5.6
Dishwashing, refrigeration, and storage, per diner	4.0-5.3
PHYSICAL EDUCATION	
Gymnasium, approximately 106' x 120'	12,720
Locker rooms, per 12x12 full length locker	6
Per tote basket	0.6

TABLE III

INSTRUCTIONAL AND ANCILLARY SPACES FOR TECHNOLOGY PROGRAMS

		(Numbers indicate areas in square feet)					
Departments & Sections	Sq. Ft. 1 Person	Labs	Shops	Tools & Storage	Offices	Class-rooms	Total Sq. Ft.
Building Construction							
Woodworking Shop	120		2400	300			2700
Concrete Constr. Shop	120		2400	300			2700
Arch. Drafting Room	55	2200		300			2500
Office - Dept. Head					120		120
Office - Two staff					160		160
Classroom						720	720
							8900
Civil							
Soil Mechanics Lab	60	1200					1200
Surveying Instr. Lab	32	640					640
Office - Dept. Head					120		120
Office - Two staff					160		160
							2120
Drafting & Design							
Basic Drafting Room	45	1800		300			2100
Adv. Drafting Room	55	2200					2200
Office - Dept. Head					120		120
Office - Two staff					160		160
One Classroom						720	720
							5300

TABLE III--Continued

(Numbers indicate areas in square feet)

Departments & Sections	Sq. Ft. 1 Person	Labs	Shops	Tools & Storage	Offices	Class-rooms	Total Sq. Ft.
Diesel - Automotive							
Basic Laboratory	170	3400		300			3700
Engine Test Lab	120	2400		300			2700
Injection Lab		650					650
Office - Dept. Head					120		120
Office - Two staff					160		160
One Classroom						720	720
							8050
Electrical							
Basic Electrical Lab	60	1200		300			1500
Electrical Power Lab	90	1800					1800
Elec. Wiring & Maint.	60	1200		300			1500
Office - Dept. Head					120		120
Office - Two staff					160		160
One Classroom						720	720
							5800
Electronics							
Basic Electronics Lab	60	1200		300			1500
Adv. Electronics Lab	90	1800		300			2100
Communications Lab	60	1200					1200
Office - Dept. Head					120		120
Office - Two staff					160		160
One Classroom						720	720
							5800
Industrial							
Methods Lab	45	900		300			1200
Office - Dept. Head					120		120
Office - Two staff					160		160
One Classroom						720	720
							2200
Mechanical							
General Metal Workshop	90		1800	300			2100
Machine Tool Workshop	170		3400	300			3700
Metallography & Metallurgy Testing	90	1800					1800
Welding & Heat Treating	120		2400	300			2700
Fluid Mechanics Lab	60	1200					1200
Office - Dept. Head					120		120
Office - Six staff					480		480
Three Classrooms						2160	2160
							14260
Metallurgical							
Adv. Metallurgical Lab	90	1800		300			2100
Foundry	120		2400				2400
Office - Dept. Head					120		120
							4620
Ref. and Air Conditioning							
Basic Refrigeration Lab	90	1800		300			2100
Adv. Ref. & Air Con. Lab	105	2100					2100
Sheet Metal Shop	45		900				900
Office - Dept. Head					120		120
Office - Two staff					160		160
One Classroom						720	720
							6100
Applied Sciences & Mathematics							
Physics & Mechanics	60	1200		300			1500
Chemistry	60	1200		300			1500
Office - Dept. Head					120		120
Office - Four staff					320		320
Four Classrooms						2880	2880
							6320
General Courses							
Business & Economics					120	720	840
Social Sc. & Mgmt.					120	720	840
English & Report Writing					120	720	840
Guidance					120	720	840
							3360

TABLE III--Continued

		(Numbers indicate areas in square feet)					
Departments & Sections	Sq. Ft. 1 Person	Labs	Shops	Tools & Storage	Offices	Class-rooms	Total Sq. Ft.
Administration & Library (Minimum)							
Administration Offices					1200		1200
Business & Records					1200		1200
Library		1800					1800
							4200
Audio-Visual Center							
Audio-Visual Lab		1440					1440

Note: Add one-third allowance for hallways, toilets, and other auxiliary spaces.

Selection and Commissioning of the Architect

The selection of the architect is a major responsibility of the board of education. This decision is usually made after consultation with the local director and a representative of the state office.

Qualifications of the Architect

Most states provide for licensing of architects who have met the minimum legal qualifications. Exceedingly important, beyond the minimum qualifications, are the architect's design ability and technical knowledge. Determination of his creative ability, business acumen, and cooperative spirit are highly desirable. Previous experience and knowledge of technical education will prove of tremendous help during the period of design and construction of the facilities. His integrity must be beyond question.

Selection Methods

The three most common methods used for the selection of the architect are: open selection (sometimes called direct selection); selection by comparative methods; and design competition. Open selection, based on the general qualifications of the architect, is the most widely used method. The main elements of the open selection method are limited to determination of the established reputation, demonstrated ability, and recommendations from previous clients. Under the comparative method, several architects are invited to present evidence of their qualifications through personal interview and written application. Less frequently employed is the method of design competition. This method is quite time-consuming and would mainly identify the architect's design ability.

Interest and Experience of Candidates

Preliminary screening of architects is a common initial step. This is followed by a more detailed investigation of a reduced number of candidates. A standard questionnaire has been developed by the National Council on Schoolhouse Construction and the American Institute of Architects for use during this screening process. Succeeding steps involve the personal interviews with candidates, examination of completed architectural projects, and discussion with former clients of the architect.

Visiting buildings designed by the candidates provides the opportunity not only to view the structure but to ascertain whether or not the board, school administrators, and faculty are satisfied with the work of the architect. At this time, additional insight may be obtained as to the architect's design competence, integrity, business ability, and cooperation.

Criteria for Selection

Excellent criteria for selection of the architect have been developed by the Wisconsin State Board of Vocational and Adult Education (Guidelines for Realistic Facility Planning for Schools of Vocational, Technical and Adult Education, 1964). These criteria are given in Table IV.

TABLE IV

SUGGESTED GUIDELINES FOR EMPLOYING ARCHITECTS

No.	Criteria	High	Average	Low
1.	Experience of the firm and past performance.			
2.	Primary emphasis of experience of the firm, such as schools, hospitals, etc.			
3.	Specific specializations of the firm as to vocational-technical schools.			
4.	Home office of the firm in relation to the project.			
5.	Size of staff and experience of staff members.			
6.	Comparative work with either public or private clients.			
7.	Past relations with local schools.			
8.	Current work loads with public and private clients.			
9.	Ability to meet budgets and schedules.			
10.	Thoroughness in plans and specifications to keep extras at a minimum.			
11.	Economic, esthetic, and mechanical success of past projects.			
12.	Recommendations and opinions of private owners.			
13.	Financial stability of firm.			
14.	Cooperative attitude of firm to meet demands and desires of owner.			

Agreement between Architect and Board

Upon the selection of the architect, the board of education should have its lawyer draw up a contract clearly stating the terms of the agreement. Not only does such a contract protect both parties but it identifies the obligations of each and obviates misunderstandings which could undermine good working relationships between the parties. A standard contract form has been developed for this purpose. Copies are available from the American Institute of Architects.

Site Selection

The selection of the site for the building is an important decision. often serious limitations are imposed through the selection of an inadequate or unsuitable site. Mainly the problem of site relates to size, location, suitability, and economy.

Securing Additional Land for Present Site

Often buildings have been erected on inadequate sites and have thus presented the problem of limited expansion or the necessity of securing additional land at an inflated price. This is the result of short-range planning. Institutions located on inadequate sites desiring to expand need to evaluate carefully the alternatives of securing additional land, modifying the existing structure on the present site, or abandoning the present location and seeking a more desirable site in some other location. Urban renewal may be the answer, Especially in the "Great Cities." Land use planners and architects have produced some marvelous innovations to overcome the limitations of an inadequate or undesirable site. However, if possible, attempts should be made, within the limitations of cost, to expand the site to meet the needs.

Selection of New Site

Under the long-range approach to the problem of sites, the site is carefully selected well in advance of the time of utilization for the new plant. School sites should be located in proper relationship with existing and proposed physical facilities of the community. Consideration needs to be given to locations relative to industrial areas, residential areas, main streets, highways, and similar factors. Central location in relation to the area to be served is important. Convenience to public transportation and adequate areas for parking is important. Most students who attend evening school classes drive their own cars.

Availability, with a minimum of additional cost, of such public-service facilities as water, gas, telephone, sewer, fire protection, and electricity is important in the selection of a site.

The National Council on Schoolhouse Construction (1958) reports on size as follows:

Although more site space may not be necessary immediately, the needs may develop soon. Experience has indicated that ultimate site requirements should be met with the initial site acquisition because land adjacent to a new school soon becomes occupied with housing developments or commercial establishments.

The size of any school site should be determined largely by the nature and scope of the contemplated educational program. Actual layouts of the spaces needed by the various phases of the program should be made.

Site information.--To secure necessary information on potential sites, the following instruments and procedures are helpful:

- Land-use map -- shows areas of manufacturing, residence, public buildings, parks, agricultural lands, vacant property, and commercial areas.
- Aerial photography-- provides a basic map with subdivisions.
- Soils map -- gives soil types.
- Topography map -- shows terrain features of the area.
- Highway map -- presents actual and projected arterials in the community and region.
- School service area map -- shows areas presently served and projected service for the future.
- Dwelling unit map -- provides information about location and type of existing and proposed dwelling units.
- Total population projection -- uses studies made by telephone, power, and water companies in their analysis of potential population development.

Site selection criteria.--While deviation from established criteria is sometimes justified, the gravity of a decision on site dictates the utmost care and consideration of all available facts, trends, and forecasts of probable future developments. Consultation with architects, landscape architects, and engineers is highly desirable in site selection. A checklist for site evaluation (Rowlands, 1966) identified the following elements:

o Size -- The most important criterion for campus planning is a site of at least 100 usable acres; 200 or more are preferable.

o Site characteristics -- The site should be in one piece and unencumbered by existing or future easements or public rights of way. A rectangular shaped site approaching a square is preferred. The area should be relatively flat; steep slopes and irregular topography should be carefully evaluated in terms of the building program. Sub-soil conditions should be examined to insure a minimum of rock, quicksand, and sub-surface water condition.

o Cost -- The site costs should include the original purchase price; development, including demolition and utilities; and any additional building costs incidental to site conditions.

The selection of a site should be done with deliberation and should not be based upon a quick decision influenced by a capital gift which may impede future expansion, have high development cost, and have other high building costs incidental to utilities and site conditions.

o Accessibility -- Studies have tended to show that the great majority of students at the existing community colleges arrive by private car pools. (Parking space should be provided for 50 percent of the student enrollment and for 75 percent of faculty and staff.) Studies also indicate that 90 percent of the evening class enrollment will drive to the site. Ease of access by automobile from all parts of the region is, therefore, rated higher than the availability of public transportation.

In comparing sites to serve best all populated areas, a factor should be

	developed by multiplying the number of students from each area by the distance to be traveled and by the time it takes to travel the distance to each of the suggested sites.
o Environment	-- The site should provide safe and healthful conditions for students, faculty, and visitors and should be relatively free from sources of noise and danger such as airports, railroads, and heavily traveled highways. The site should also avoid the extremes of cold, excessive winds, smog, fog, and offensive odors. The surroundings should tend to create a feeling of pride and respect.
o Regional planning	-- The site must be acceptable in the regional plan of the locality, must not interfere with other regional projects, and must be a project of value for all citizens of the region.

Site Beautification

Attractive school grounds enhance the educational environment and give status to the total educational program. The building should be so located on the plot that plantings provide an appropriate setting for it. A plan for planting needs to be prepared by a competent landscape architect for the school grounds before actual placement of the building occurs. Once such a plan has been developed, the actual work of planting can be achieved progressively over a period of years if sufficient funds to complete the landscaping are not immediately available in total.

Long-Range Implications of Site

Site selection is one of the most important aspects of planning a new educational facility. It will determine for many years hence the character and nature of the educational opportunities which can be provided by the institution.

Establishment of Design Criteria

Design is the function of the architect. Creativity, imagination, and invention are the essentials for good design of a forward-looking technical education facility. The building must provide an environment which stimulates, motivates, and inspires those who learn and those who teach if it is to render the maximum educational service. The ability of the architect to design such structures is enhanced or limited by the ability and effort of the educators to communicate the essence of need and the other desirable elements to be incorporated into the new building. Having identified innovative features, the architect will perform research if necessary and recommend the advisability of incorporating these into the proposed structure. Visitations by the architect and educators to outstanding facilities of the same or similar function are often helpful.

Curriculum Objective

"Form follows function" is a basic concept of design. Technical education is dedicated to preparing students for jobs, helping them to hold jobs, and expediting advancement to positions of higher responsibility and more challenging opportunities in the world of technology. These objectives must be constantly kept in mind if the school is to serve the basic purpose for which it was created. The facility must enhance and reflect these objectives in its form and design.

Space Relationships

Determination of space relationships is a fundamental responsibility of the educator in the development of the educational specifications. This may be presented as part of the tabular information using headings such as: space name, size, access to, and other significant information.

Often during the process of writing the educational specifications, schematic plans of space layouts are developed. These simple floor-plans may be of help to the architect in his space relationship study. Relative organization of instructional spaces with suggested layout of student stations, machines, equipment, furnishings, and other educational hardware is essential. Size of each unit needs to be given with indication of the provision for services and other unique features. Relationship of units requiring utilities to the sources of utilities, such as service columns, service cavities, or overhead source must be considered.

Functional storage of adequate capacity with proper provisions for safety is important. Location of spaces in relation to ramps, loading platforms and staging areas, as well as the width of doors, and the height of ceilings illustrate another problem of space relationships. Relationships of instructional areas to central units as the library-resource center (also specific laboratory-shop areas) is significant for the teaching-learning process.

Flexibility and Expansibility

Changing technologies demand changing curricula. Facilities frequently need to be modified to meet these changing conditions. Flexibility is a key word in order to accommodate changing educational needs. Movable partitions (non-load-bearing) and service cavities or columns are essential for maximum flexibility. Zoned environmental control and modular construction are helpful in securing flexibility.

Design and construction should permit expansion with minimum modification and least possible cost. It is possible to plan a one-story building in such a manner that it may be expanded at many points. Such an arrangement makes it possible to expand each service or program without locating the addition remotely from the original unit or without relocating the entire program. This type of expansibility is enhanced when a campus-type building is chosen rather than more massive building units. It is further enhanced when a finger rather than a cluster or back-to-back type of plan is adopted (Guide for Planning School Plants, 1958). However, the choice must reflect careful consideration of comparative cost, adaptability, and functional value for the educational program.

Environmental Control

This encompasses proper control and balance of temperature, humidity, dust, acoustics, and lighting. Studies have revealed that learning improves with the control of environment. Reducation of corrosion of metal in machine units is a significant cost factor in the laboratories and shops of technical programs.

Aesthetics

In architecture, the total effect produced in the structure, either inside or outside, produces the aesthetic aspects described as beauty or the lack of beauty. However, it can be said that the school plant which is truly functional does fulfill a physical function in addition to an emotional function--some describe this also as beauty. It is desirable to blend the aesthetic factor with those other essentials of spatial environment, safety environment, sonic environment, thermal environment, and visual environment. Good architecture is beauty. Beauty involves unity and proportions, fluid quality of space, structural expression, appropriate use of color and texture, and applied art (NCSC Guide for Planning School Plants, 1964).

Safety

Providing reasonable safeguards for safety is a responsibility of the school officials. Major concerns are in four basic categories which the designer of the plant is usually aware of. These are:

o Structural safety	-- Engineer and construction, i.e., soil tests under foundation; live load for rooms; lateral forces building can resist; strength of structural members.
o Fire safety	-- Materials and design, i.e., use of protected noncombustible materials (fire-resistive ceilings and fire retardent interior finishes); adequate, properly placed exits and escapes; installation

of fire walls and doors; sprinkler systems; and alarm systems.

Strict observance of safety codes and standards.

- Disaster -- Protection and evacuation in event of emergency conditions (thermonuclear warfare, earthquake, tornado, etc.).
- General safety -- Pedestrian traffic; vehicular control (segregated from pedestrian traffic); student movement within building (design of corridors, exits, stairways, etc. in relation to patterns of flow); building interior and exterior features; site condition.

Economy

Many factors are important when economy is considered. In the booklet (*Thirteen Principles of Economy in School Plant Planning and Construction*, 1961), the following definition is given: "Economy as applied to schoolhouse construction implies a wise and carefully managed expenditure of school funds in providing facilities which are adequate in terms of the needs of the educational program at the most reasonable cost." This publication identified the following as significant:

- Selection -- Consultants, architect, site, materials, etc.
- Educational planning -- Cooperative planning; philosophy and aims.
- Usefulness -- Adequate and efficient to meet the needs.
- Flexibility -- Internally adaptable to changing educational conditions.
- Expansibility -- Enlargement and extension at reasonable cost.
- Exactness -- Exact and accurate drawings and specifications.
- Simplicity -- Aesthetic expression combined with educationally functional design minimizing excessive ornamentation.
- Compactness -- Economical arrangement of spaces.

- Multiple use -- Designing for a variety of activities but preserving integrity of unique spaces when essential.
- Modular coordination -- Designing the building according to a system of modular dimensioning (savings in materials and labor; adds adaptability to changing needs).
- Repetitive design -- Use of recurring structural units and repetitive installation procedures.
- Durability -- Use of materials that minimize future maintenance and replacement costs.
- Prefabrication -- Fabrication of standardized parts of the building at the factory rather than on the site.

Office Space and Service Areas

The administrative offices should be planned and designed with several ideas in mind: (1) ease of availability to the public, teachers, and students; (2) use for administrator-faculty-student-public conferences; (3) ease of inside and outside communications; (4) maintenance of school records.

Redesign of the administrative area to provide for expanding or decreasing space allocations must be considered. Flexibility can be provided by easily altered interior partitions. Careful placement of units for lighting, heating, ventilating, and special wiring for phones and electrical service outlets will add greatly to the flexibility of this area. Depending upon the size and complexity of the administrative plan for the institution, provision needs to be made for:

- Executive offices -- President or director, and assistant directors or principals.
- General offices -- Receptionist, office manager, secretaries, bookkeeper (accountant), record vault, machine room, and supply storage room.
- Guidance suite -- Counseling and conference areas, records vault, browsing area of guidance materials.
- Clinic and health services -- Nurse's room, dressing booths, rest rooms, examination room, and waiting area.

o Instructors' offices	-- Private office for each, even though small in size; not over two in one office.
o Cafeteria and food service	-- Central service with supplementary canteens (maybe stand-up type canteens).
o Employees' lounge	-- With limited food service, convenient to office area and auditorium area.
o Students' lounge	-- A center for student hospitality with some food service (minimum: vending machines or snack bar).
o Central supply receiving and storage	-- A center for receiving, shipping, staging, and warehousing for the total institution.
o Custodial and maintenance shops	-- Custodial storage conveniently located with sinks in various locations, central repair and maintenance shop.
o Rest rooms, and drinking fountains	-- In conformance with code.

Library-Resource Center

In modern facilities planning, the library-resource center needs to be planned to provide space for reading and reference rooms, study carrels, and audio-visual library and viewing areas. Consideration needs to be given to micro-film and microfiche readers and storage of these materials. Planning should include consideration of projection and closed-circuit television as well as equipment for computerized instruction.

A standard of a minimum of 20,000 selected volumes exclusive of duplicates and textbooks for the first 1,000 students, with an additional 5,000 volumes for each additional 500 students has been suggested. (Rowlands, 1966).

Laboratories and Shops

The laboratories and shops provide the "heart" of a technician education program. Planning and designing of laboratories and shops "geared" to the needs of students whose goal is employment are mandatory. Visitation to industrial plants and deep involvement of advisory committees composed of members familiar with the needs of industry are very helpful.

Laboratories must be designed to provide for real equipment, simulators, adequate student work stations, and ample storage. The most significant laboratories for programs of technical education are: physics, chemistry, mechanics, hydraulics, fluid power, and instrumentation. Suggested space requirements range from 60 square feet per student for physics and chemistry to 70 square feet for fluid power (See Table III). Safety factors such as exhaust devices, fume hoods, and fire extinguishers need to be considered. Space for teacher preparation of at least 75 square feet should be provided for such supplies and equipment as are required for the instructor's laboratory demonstrations and experiments, i.e., sink with hot and cold water, compressed air, and common voltages of electricity. Cabinets for storing chemicals must resist corrosion and may require ventilation. Provision should be made for the storage of flammable substances in accordance with good standards of fire prevention and code requirements.

In the book Secondary School Plant Planning (1957) shop facilities are described as providing for, "...planning, investigating, testing, conferring, demonstrating, teaching with visual and auditory aids, and evaluating pupil development, as well as for manipulating tools and other equipment." Development of technical skills requires realistic, modern equipment comparable to that found in an industrial shop. The "hardware" functions of technicians are a basic part of the competencies demanded by employers in industry. The shops should be planned to accommodate actual industrial processes and activities, on a somewhat reduced scale, but utilizing the same techniques and methods, tools and equipment, and other related facilities found in industry. Table III provides suggested space requirements for shops common to technical programs.

Classrooms and Auxiliary Areas

The environment of the classroom must be conducive to discussion and learning. It must be planned to house those learning resources essential to the courses taught in the room. Some demonstrations are conducted as part of the classroom activities; so provisions must be made for introducing these at the appropriate time and then either removing the units to the shop or laboratory or returning them to proper storage. A definite advantage exists when provision is made for location of units in the area readily accessible to the laboratories or shops where the applied activities related to the classroom activities are housed.

Planning should provide an atmosphere for student participation in an informal learning environment. Provision needs to be made for applications of the recently developed and developing technologies of education (i.e. team teaching, programmed instruction, etc.) and new innovations in media (i.e. audio-visual equipment, projection television, etc.) where teaching-learning experiences are enhanced by such implementation. Table III provides information relative to suggested classroom size.

Auxiliary spaces are service areas for activities related to the instructional program. Priorities are usually determined in relation to the value for the educational program of the institution. In fact, present trends reflect a desire to utilize as many as possible of the auxiliary spaces for some instructional purpose as well as for the usual auxiliary function. In some plants, the equipment room housing heating and air conditioning units for the facility has been planned so that learning experiences for students of heating and air conditioning take place in the space under the guidance of the instructor. These activities are limited to observation, instructor demonstration, and related experiences which do not interfere with or in any way interrupt the normal work of the service units. In other institutions warehouse and storage spaces become laboratories for students needing this kind of related instruction as part of their program. Many auxiliary areas, with careful planning and effective layout and design, can make valuable contributions to the instructional program. Suggested space requirements are given for auxiliary spaces in Tables II and III.

Local and State Approval

Customary provisions of state regulations mandate submission of preliminary drawings and specifications for state approval. Careful study and conformance with the standards established for the particular state for the various instructional and auxiliary spaces as to floor space, ceiling heights, space relationships, safety factors, and similar features need to be observed. Information is usually available from the Director of School Building Service or the Vocational-Technical Division of the State Department of Education.

Approval by the local board must conform to the legal pattern established and must involve such other steps relating to capital outlay as are required by local and state regulations. Approval of the preliminary drawings and outline of specifications by the board of education permits the architect to proceed with the development of the detailed working drawings and specifications needed so that various contractors can prepare bids for the construction of the school plant. Any changes by the board after this approval result in both additional delays and increased costs.

Development of Construction Plans and Engineering Specifications

The working drawings describe graphically the work to be performed by the contractor; engineering specifications name and describe the materials and equipment needed. Development of the working drawings and the engineering specifications represents a major responsibility of the architect. He usually employs consultants and specialists in various phases of engineering to handle certain details such as acoustics, air conditioning, mechanical, electrical, structural, and foundation engineering. The architect's office expends great care and skill on the organization, preparation, and checking of the working drawings and specifications. These documents must be free of conflicts, redundancies, omissions, or errors which would lead to confusion or waste on the job. Complete, accurate, and carefully executed working drawings and engineering specifications have a tendency to result in lower bids than occur when incomplete, careless documents are submitted for bids. Insufficient time allocated to the architect is often responsible for shoddy work on his part.

Upon approval by the local board of the completed working drawings and engineering specifications, submission to the State Department follows. Typical of state regulations are the following (Guide for Schoolhouse Planning and Construction, 1964):

> Final plans and specifications submitted for review and approval by the State Board of Education shall meet the following requirements and shall conform with the best professional practices. They shall show clearly, accurately, and completely information on all phases of the work to be undertaken. (Then follow statements that enumerate several qualifications which must be complied with in the final plans and specifications.)

Upon the acceptance by the local board and the State Department of Education of the working drawings and engineering specifications, the steps may be taken to secure bids and let the contracts for construction.

Bidding Procedures

State law normally requires that contracts for construction of new facilities be awarded on the basis of competitive bids secured after a period of required advertising. The architect works closely with the attorney for the board of education on bidding procedures.

The architect normally takes responsibility for preparing the advertisements, bid forms, bid bond forms, performance bond forms, and forms of agreement between the board of education and the successful bidders (Guide for Planning School Plants, 1958).

Several important considerations must be resolved at this time, such as:

- Timing of bids -- Certain seasons result in lower bids.
- Rejection of bids -- Limited conditions justify rejection, i.e. price too high.
- Priority plan -- Whether to provide for a base bid with additional alternates or one package bid only.
- Portable units -- Whether to include the furniture and portable equipment as part of the total contract package or bid these separately.

- General contract -- One general contract or several separate ones.

Awarding the Contract

Bids normally must be submitted in sealed envelopes at a specified time and place. The bids are publicly opened and read and are entered in the minutes of the board of education. The bids are then analyzed, usually by or with the assistance of the architect. The contracts usually are awarded to the successful bidder at a subsequent meeting after the analysis of bids has been completed (Guide for Planning School Plants, 1958).

The standard form of contract employed has been developed by the American Institute of Architects. Departure from the form should be made only upon the advice of legal counsel. This form of AIA contract consists of a 10 page document covering 44 articles of general conditions of a contract for the construction of the structure.

Supervision During Construction

The architect sees that the building dimensions are correct and that it is properly oriented on the plot from the beginning of construction. He keeps a schedule of the work and adjudicates differences among the contractors. He supplies instructions and detailed drawings where needed in addition to the contract drawings; and he inspects the shop drawings, e.g. for steel work, cabinet work, or setting drawings for terra cotta, with minute care. He is a consultant to the contractor on materials, measurements, and many other details. He establishes a schedule of values and against it checks the contractor's claim for periodic payments on a percentage of work done; thus he certifies all payments to contractors. He arbitrates controversies arising out of the contracts. He handles change orders affecting the amount of contract. He coordinates the work of other inspectors. It is clear that these tasks are of an executive and supervisory character. Ultimately the architect's reputation is at stake, and he tries to see that his client, the school district, receives maximum value in the project (Strevell and Burke, 1959).

Often on construction of this type the board of education hires a "clerk of the works" who inspects all materials and processes during construction.

Acceptance of Completed Facility and Payment

Upon completion of the project, final inspections are made by the architect together with the board of education or its representatives. Modifications, if necessary to conform to specifications and working drawings under the contract, need to be made before acceptance of the building by the board of education. The final payment to the contractor needs to be withheld until the work of the contractor has been formally certified by the architect as having met the requirements of the contract.

References

Brubaker, C. W., & Perkins, L. B. "Space for Individual Learning," School Executive and Educational Business, February, 1959.

Chase, W. W. "Facility Design Considerations," The American School Board Journal, Bookazine (October, 1966), 24-27.

Chase, W. W., Browne, J. W., and Russo, M. Basic Planning Guide for Vocational and Technical Education Facilities. Washington: Superintendent of Documents, 1965.

Developing Educational Specifications for Vocational and Practical Arts Facilities. Washington: American Vocational Association, 1960.

Edgerton, W. H. "A Cost Guide to Planning New Educational Building," Technical Education News, XXVI, No. 1 (September, 1966), 35.

Emerson, L. A. Vocational-Technical Education for American Industry. (Circular No. 530). Washington: U. S. Government Printing Office, 1958.

Emerson, L. A. Technician Training Beyond The High School. Raleigh: Vocational Materials Laboratory, State Department of Public Instruction, 1962.

Emerson, L. A. Education for a Changing World of Work, Appendix I, Technical Training in the United States. Washington: U. S. Government Printing Office, 1963.

Emerson, L. A. "Needed: Better Planning for Statewide Technician Education," Technical Education News, XXVI, No. 1 (September, 1966), 19-20.

Establishing and Operating Area Vocational-Technical Education Programs in Michigan. (Bulletin No. 2153). Lansing: State Board of Education, 1966.

"Esthetics and Prestige are Keynotes for Future California Vo-Ed School," School Shop, XXVI, No. 4 (December, 1966), 10.

Harris, N. C. Technical Education in the Junior College: New Programs for New Jobs. Washington: American Association of Junior Colleges, 1964.

Gardner, J. W. "Quality in Higher Education," Current Issues in Higher Education. Washington: Association for Higher Education, 1958.

Glendenning, Jr., H. P. "Capital Funds for Technical Education." Paper read before the National Leadership Development Institute in Technical Education, Rutgers - The State University, June 9, 1966.

Greiber, C. L. Technical Education Post High School Two-Year Associate Degree. (Mimeograph). Madison: State Board of Vocational, Technical and Adult Education, 1964.

Guide for Planning School Plants. East Lansing: National Council on Schoolhouse Construction, 1958.

Guide for Schoolhouse Planning and Construction. Trenton: State Board of Education, 1964.

Guidelines for Realistic Facility Planning for Schools of Vocational, Technical and Adult Education. Madison: Wisconsin State Board of Vocational, Technical and Adult Education, 1964.

A Guide for the Establishment of Comprehensive Community Colleges in North Carolina. Raleigh: State Board of Education, 1963.

Long Range Planning. (Book No. 2 of the Economy Series). Hartford: Connecticut State Department of Education, 1962.

Miller, W. W. "New Vocational Education Facilities," Education, LXXXVII, No. 3 (November, 1966), 136-139.

Morrison, D. G. & Martorana, S. V. Criteria for the Establishment of 2-Year Colleges. Washington: U. S. Government Printing Office, 1960.

NCSC Guide for Planning School Plants. East Lansing: National Council on Schoolhouse Construction, 1964.

Nelms, W. L. "Standardization of Educational Specifications," The American School Board Journal, CLI (July, 1965), 44-46.

Planning America's School Buildings. Washington: American Association of School Administrators, 1960.

Report of the National Leadership Development Institute in Technical Education. New Brunswick: Rutgers - The State University, 1966.

Rowlands, E. M. "Facilities Planning, Construction and Financing." Paper read before the National Leadership Development Institute in Technical Education, Rutgers - The State University, June 9, 1966.

Rowlands, E. M. "Space Planning Guide--Two Year Colleges." Paper presented to the National Leadership Development Institute in Technical Education, Rutgers - The State University, June 9, 1966.

School Shop Planning. (Bulletin No. 2135). Lansing: Division of Vocational Education, Department of Public Instruction, 1959.

Secondary School Plant Planning. East Lansing: National Council on Schoolhouse Construction, 1957.

Smith, L. F. & Lipsett, L. _The Technical Institute_. New York: McGraw-Hill Book Company, Inc., 1956.

Strevell, W. H. & Burke, A. J. _The Administration of the School Building Program_. New York: McGraw-Hill Book Co., 1959.

Thirteen Principles of Economy in School Plant Planning and Construction. East Lansing: National Council on Schoolhouse Construction, 1961.

U. S. Office of Education. _Vocational and Technical Education Fiscal Year 1963_. (OE-80008-63). Washington: U. S. Government Printing Office, 1964.

Venn, G. "Needed: A New Relationship Between Education and Work," _School Shop_, XXIV (April, 1965), 42-45, 106.

PART IV

FINANCE

FINANCING PROGRAMS OF TECHNICAL EDUCATION

by

Joseph T. Nerden*

In the recent publication, "Local, State and Federal Partnership in School Finance," Arthur F. Corey indicated: "School finance in America in 1966 is in chaos. That is to say, it is in disorder and confusion. This crisis, for such it is, exists not because of our professional leadership in school finance, but in spite of it. Educational literature is full of dire warnings which have gone unheeded." Corey (1966) indicated that public school personnel have far more useful and accurate information concerning how to finance education than they are permitted to use. In a sense, this situation is reminiscent of the anecdote of the farmer who refused to attend evening adult classes conducted by the Agriculture Extension Division, saying, "I don't need any further help and education, since I am not now farming half as well as I know how already." This salient point of view in school finance may be debatable, since it is not purely the matters of seeking sources of funds, budgeting them, and expending them that make up the bulk of the responsibilities which must be assumed by those who are responsible for financing programs of public and technical education. Knowledge of school finance presupposes that the individuals responsible for major money matters be concerned with many more important factors than just the numbers of dollars involved. Educational finance is concerned with many aspects of the total school education program which are indicated here but briefly.

Basic Factors Which Affect Financing of Technical Education

Philosophy

Finance is concerned with the philosophy of vocational and technical education held by the technical education administrator. If his philosophy is that which includes meeting the needs of all individuals who make application to the institution for some form of technical education, his procedures for financing the program will be in one direction; if, by contrast, his philosophy of technical education is narrow, and only certain levels of technical instruction are provided within an institution, then his philosophy will provide quite a different basis for financing the program of instruction. Either philosophy, when translated into dollars, must anticipate buildings, facilities, staff and all other operating expenses in terms of the philosophy held, and the results will be quite different. Hence, it is imperative in the very beginning to settle upon a philosophy which includes answers to such questions as: Whom shall we serve? What shall we serve? What facilities do we need to serve such persons? What level of instruction is anticipated?

Political Attitudes in the Region

Finance is affected by the political attitude and the manifestations of the power factors in the region. If, for instance, the political structure of the state is oriented in the direction of making the state one of a highly industrialized group of states, or if there is a strong effort being exerted toward attracting industry to the area and of holding and expanding the industries currently located in the region, then there is a likelihood that a very liberal attitude on the part of the political structure will be evidenced in matters concerning finance. Politics is also concerned with the attitudes and feelings of those of the electorate who are on the lower levels and who are likely to have to react to a bond election or a referendum permitting the direct appropriation of funds for building, equipping, and maintaining technical education facilities. Certainly finance must then be concerned with the attitudes held by the general population in the area, and where this attitude is positive and constructive and forward-looking, the financing of the institution will be facilitated with ease. Where the need for public information and assistance is urgent in providing the population with information concerning the value to the region of technical education, both socially and economically, then the financing will show the reluctance on the part of some individuals to expend funds, particularly if in their ignorance, they see little if any possible value to the region.

---

*Dr. Nerden is Professor, Department of Industrial and Technical Education, North Carolina State University.

The "Status Quo"

Financing of the school and its facilities and budgeting for recurring expenses will be affected by the "status quo" in the community. This "status quo" should be considered quite apart from the requirement for widespread community information of the type indicated in the preceding section. Strategy is all-important in matters of finance, since funds needed to build and equip a technical institution usually are obtained only through regular public sources and only when the majority of the electorate believes that it can afford the investment. The strategic time for the scheduling of a bond election, the state of the tax structure in the region, and other such elements as the numbers of other types of schools that have been built recently or which are anticipated for the total school program would all have to be part of the consideration. Financing of technical education must be concerned with the timing and the strategy of the particular region, and the situation will be different for each region.

The Conflict Between Vocational and Liberal Elements

Finance is concerned with another aspect of public opinion and acceptance. In some communities of the nation where there is still a strong reliance upon liberal education as the only kind of education to fit an individual for the world of work and for participation in a world society, there is little likelihood that a program of technical education will be generated spontaneously in the population and carried forward with any degree of enthusiasm. In some of the community colleges currently in operation in the nation, this element is noticeable, and the lack of success of the occupationally oriented curriculums in these community colleges may be in part attributed to the reluctance of some of the members of the community, and even members of the boards of trustees of such institutions, to grant equal status and respectability to occupationally oriented curriculums. Hence, in the financing of technical education, the technical educator must continually be cognizant of the necessity of working with the individuals in the area which the institution is intended to serve. This he must do to ameliorate to some degree attitudes which would in the final analysis defer the necessary action required to put into operation an appropriate program of technical education. Examples of this need to be constantly aware and fully cognizant of public opinion and acceptance for vocational-technical education may be noted in a number of the junior and community programs in the nation. In several, the intent is to make "little ivy-league two-year colleges" of the institutions, in the hope that such a procedure will bring a degree of status and respectability to them, the inference being that anything of a vocational or technical nature would lower their status. On the other hand, in Quincy, Massachusetts, a large city in the industrial northeast, public opinion and acceptance of vocational-technical education is at such a high level that several million dollars recently were actually put into the escrow account of the school department well in advance of the actual building of the new vocational-technical school for the region. This action showed a confidence in the technical education personnel at the same time that it illustrated an attitude held by the general public concerning the values which vocational education might bring to the community and the area. Further, unless the general public understands the specific objectives of technical education, is familiar with the kinds of students that are accepted for enrollment in the programs of the institution, and feels a part of the need to help these young people to prepare for job opportunities currently available, the responsibilities of the individual or committee financing technical education tend to multiply. One item of major importance which should be part of the general information held by the public, for which the school purports to provide services, is the fact that technical education will require an investment of funds much greater in magnitude than that for any other kind of public education.

Knowledge Concerning Sources of Funds

Financing of technical education presumes that the individuals who are responsible for the program of financing the project be fully cognizant of the sources of funds from federal, private, local, and state sources. They should know the answers to such questions as the following: How much of the technical program anticipated for the school may be reimbursed from state and/or federal funds? Instruction? Facilities? Supervision? All? Under what conditions will reimbursement be possible? If reimbursement is made available, what will be the net cost to the school annually for conducting the technical programs? Do the overall school administration and the general public as well as the political structure in the region also know of the possibilities available for reimbursement of some or all of the technical programs?

Reimbursement may be possible from a wide variety of state and/or federal legislative acts. For instance, where technical education is offered on a secondary level, those responsible for financing the program should carefully review the possibilities provided in the Elementary and Secondary Education Act of 1965 for opportunities to improve the program of secondary level technical education with funds made available under the Act. In Maine, the State Department of Education has already obtained from Title V of the ESEA well over $100,000, with the expectation that these funds will be used to conduct a statewide study of the need for vocational and technical education. This is interpreted within the provisions of the Act to indicate that the expenditure of the funds will improve the services of the State Department of Education and will make possible its operation at a higher level of efficiency. Here then is a prime example of funds being made available from an Act which is not primarily one of vocational intent. In his responsibilities for conducting the financial program of a school district or region, the administrator must be aware constantly of the possibilities of each of the laws and provisions in order that he may obtain every penny of funds made available for the purposes accommodated by the law.

Social and Economic Implications for the Region

Financing of technical education must also be concerned with the social and economic implications for the region. The administrator responsible for financing the project must be prepared to present positive points of view concerning questions of the following nature: Is it expected that the technical programs will meet only those needs of the youth and adults required for the industries and businesses in the region, or is the intent of the technical program to be much broader and to meet the needs of youth and adults, wherever they may wish to travel and work? Is the program of technical education concerned only with the economy of the immediate area, or is the intent of the technical program to bolster the economy locally at the same time that it contributes to the economy of the state and the nation? What is the posture and responsibility of the program of technical education where it is in direct contact with the social concerns of the communities which are now requiring increased attention to minority groups, along with the provisions of technical education facilities for the socially and economically deprived individuals?

The Legality of What Is to Be Financed

Technical education financing requires a knowledge of the legality of what is to be financed. Administrative concern with financing must be fully aware of those parts of the operating school program which under the law require a contribution to be made by students or staff or others. Conversely, in certain parts of the nation, it is illegal to make any charges whatsoever for public education. This is especially true on the secondary level where, in some states, the student is entitled to a free public technical education at no expense to himself.

The illegality of fees and charges in such cases is clearly indicated, and it would certainly be illegal to anticipate income from fees and charges by the establishment of requirements that students prepare themselves with any of the minor tools needed in connection with the technical instruction in such fields as mechanical drafting, industrial electronics, and architectural drafting. Where mechanical draftsmen are required to participate for several weeks in related technical instruction in a machine shop, it would likewise be illegal to require such students to purchase such minor equipment as a steel scale or a micrometer. Legality of financing has often opened up many serious arguments, particularly where the program of financing bears upon the expenditure of funds for which budgeting purposes did not anticipate a need. The administrator responsible for financing a technical program must continuously be cognizant of the need to expend funds only for those parts of his dollar budget program for which provisions were made and funds granted. Corbally (1962) deals extensively with this topic and cautions administrators to anticipate in such budgeting, the likelihood of future contingency and emergency financing. Only under those conditions where a contingency fund is made available and conditions surrounding the use of contingency funds are identified may the administrator with confidence made use of funds in a budget.

Knowledge of Financial Procedures

Financing of technical education requires knowledge of procedures. Administrators who are charged with the responsibility for financing technical education may learn the hard way, but they may make their tasks much easier if they know in advance that there is advantage to the responsible agency when an organized approach is made to the problem of finance and a step by step procedure is followed. It is not the purpose here to identify a long list of the steps, but any such list should include the following:

1. There should be assembled all of the pertinent facts and figures concerning the needs of students for training, as well as the employment opportunities which graduates have every reason to expect will exist at the conclusion of the training, whether those job opportunities be local or at a distance from the training center.

2. Public information must be well distributed concerning each of the items above and a constant flow of information maintained to the tax-paying general public.

3. Since the school is an instrument of the public and must be responsive to the needs of the public, all business matters concerning the school must be carried on in full view of the public. These business matters concern contracts, purchases of equipment and materials, salary structures and schedules, and other such matters. An example of this need for knowledge concerning methods and

procedures for conducting finance was indicated in the February 7, 1966, issue of the New York Times, in which it was estimated that the State of Connecticut's contribution to an elementary school in Norwalk, Connecticut, amounting to $500,000 was in danger of being withheld only because of a technicality overlooked in the formal advertisement of construction bids. The matter has since been settled, of course, but the error could rightly be charged to the lack of knowledge of the individual whose responsibility it was to prepare for the financing of a program of education. The same kind of problem has had its counterpart many times in the field of technical education, and while the administrator's chief responsibility, he believes, is with the "manipulation of dollars," occasionally he does not ultimately get to the point of having this opportunity to manipulate the dollars since his lack of knowledge of procedures and methodology for conducting financial matters has ruled him out of the possibility.

The Patterns of Organization

Financing of technical education has several other characteristics which must be considered. These include a consideration of the pattern or organization planned for the school, as well as a most important facet of financing, that of making financing serve the purpose of helping to develop future leadership in the field of technical education. In the first case, financing presupposes the knowledge of administrative, supervisory, and instructional patterns of organization which would result in the identification of the actual numbers of supervisors and administrators necessary to carry on day, evening, and/or extension programs. The identification of the specific responsibilities and duties of each classification of person would provide basic information concerning how many of each classification or category of service would be necessary to staff the institution with supervisory, administrative, and teaching personnel. A question often raised in connection with this kind of consideration is: Does each kind of activity of a supervisory or administrative nature require a totally separate individual, or is it not possible to combine several duties within the position of a single professional staff individual? Still further, in the concern for the pattern of organization, the administrator should give much thought to the purchase of supervisory and/or administrative services on an hourly basis instead of on a full-time basis, especially where the enrollments in the technical programs are low and the overhead costs of salaries for supervision and administration may be prohibitive.

Where the concern is for in-service growth of the faculty, every possible opportunity must be seized for assisting individuals to grow into positions of leadership in the field of technical education. This is especially true at the present time when there is a critical shortage of this category of high caliber personnel. Hence, in matters concerning budgeting, financing, accounting, and management of programs of technical education, excellent opportunities prevail for the administrator to make effective use of the procedures and methods to assist other members of the school or regional faculty to grow into knowledgeable and effective leadership positions. Throughout the total program of finance (which involves all of the characteristics identified in the several items discussed up to this point), there is much learning which may take place, and this learning is essential to the effective administration of any program of technical education. Members of the teaching staff, or individuals in a department-head type of position, or others within the technical education staffing pattern should be given every possible opportunity to participate in these activities, to the extent that time for this purpose may be made available to them. In a sense, to the extent the administrator assists in the growth of professional personnel in the institution, to the same extent he is demonstrating a level of cognizance and a knowledge of his responsibility to help them acquire the additional learnings required for future leadership positions. Finally, the progressive, democratic administrator should make every possible use of the needs and demands of the school to help bind the technical school faculty together with a common purpose and common understanding of education and its financial costs and problems. The social process in supervision and administration, the involvement in the school finance program, and the opportunities to grow into leadership positions may be initiated, augmented, directed, supported, and guided by the intelligent administrator.

Methods of Financing Technical Education

There are about as many different ways of financing technical education in the United States as there are different kinds of programs of technical education. Some programs operate directly under a public school board, others operate under a public board, others operate under a board for higher education, and still others operate and are conducted by trustees who in turn report through a board of higher education or a board of regents. Many other kinds of programs of city-wide, county-wide, or state-wide nature are conducted in the nation. As was pointed out in the earlier section, the importance is not so much a matter of the organizational structure under which the program of technical education is to operate as it is the intelligent management, organization, and financing of the program which takes into cognizance all of the factors indicated earlier. Each of the different methods of school operation much be financed, and each has its merit when considered from the standpoint of the needs of the area, the community, or the state. At one time, it was believed that a small state could best operate its program of technical education by adhering to a central state control of its schools and a central state financing of the system of schools. This was the pattern that was developed in Connecticut and is the one under which that state is still conducting its vocational and technical programs. The merits and limitations of such a system will be discussed subsequently. The size of the state (which was a contributing factor in Connecticut) quite evidently did not apply when the State of North

Carolina developed its extensive system of Industrial Education Centers and later converted them to a system of comprehensive community colleges and technical institutes. Here the size of the state apparently made no difference. Other states such as Florida, California, and South Carolina organized quite extensive statewide programs in the field of technical education. It would take much time to discuss the relative merits of each, but suffice it to say that with the needs of the state and the regions of the respective state under consideration in each case, the merit of each type of state system may be successfully defended. However, there are characteristics of each which when singled out bear specific mention and attention. In the case of the statewide operation of technical education programs in Connecticut, the schools in that state are totally owned, conducted, staffed, maintained, and supplied from a central state treasury. Supervision and administration as well as teacher education are centralized in the State Department of Education, Bureau of Vocational Education, which results in many similarities in the operation of the 18 institutions, much flexibility, and, to some extent, commonality of purpose. On the other hand, in the system of 43 individual units now part of the statewide system of community colleges in North Carolina, nearly every one of the institutions has its own individual board of trustees and is particularly responsive to the needs of the immediate region. The programs of technical education offered in each of the 43 units is carefully identified with the region, and while the program lacks some of the flexibility which may be noted in Connecticut, there are certain strong characteristics which deserve commendation. The development of a program in North Carolina requires considerable local participation, local funds, and local initiative. The feeling that the school is part of the region and is the result of regional need and determination to have a program of technical education is a strong argument for local participation in a statewide program.

On the debit side, the lack of flexibility in one program and the extensive use of the flexibility factor in the other is worthy of note. In Connecticut, for example, since the budgeting and financing activity is centrally located within the broad program of vocational education of the State Department of Education, it is possible to transfer funds within the system and make them available on short notice, where in other statewide programs such as those conducted in North Carolina, Florida, California, South Carolina, and other states, the use of funds originally provided for one institution are not as easily transferred out of the budget of one unit for use by another. This would be true also of the transfer of equipment, facilities, staff, and other characteristics of the operating program.

The investment of funds in technical education is considerable and often requires that several regions or even counties give consideration to joining forces in the provision of facilities and the maintenance of an institution for the development and training of personnel for technical positions. The State of New York with its rather extensive

BOCES has done much to bring to the attention of the nation the thinking and devices that might be brought to bear upon the problem of providing regional educational services for students. The Board of Cooperative Educational Services (BOCES) has made it possible for several counties to get together on the financing of a particular service or facility needed by students in any part of the state. Approximately 15 BOCES areas were established and studies conducted during the last five years out of which came recommendations for the provision of technical education facilities to meet the need of the youth and adults in the regions. These BOCES units require that several counties merge on the matter of coordinating their resources and their personnel in order to plan, organize, supply, equip, administer, supervise, and finance programs of technical education. State support is provided, and through the Office of the State Director of Vocational Education, some federal funds are also provided for this purpose. This is an especially effective means of providing services in areas where any one region, town, city, or county would find it too much of a burden to begin operation of a technical facility on its own. Large regions of other states have given significant thought also to the development of technical facilities on a multi-county basis, and these are illustrated by the four-county project in East Central Illinois in which the four counties of Champaign, Douglas, Ford, and Piatt joined forces, intelligence, and resources toward the planning and development of a post-secondary technical facility to be located in the Champaign County area. On the eastern shore of Maryland, the same procedure was followed, and four counties (Caroline, Queen Anne's, Talbot, Kent) gave careful consideration to the technical needs of the four-county area. Joining forces through both their county resources and educational leadership has provided the beginning plans for Chesapeake College, a two-year institution soon to be erected in that area.

It has been pointed out many times to the members of state legislatures, to congressmen and senators of the U. S. Congress, and to most citizens where an institution of technical nature is under consideration that the investment of funds for technical education often is double that for similar facilities, staff, and maintenance of ongoing expenses for other kinds of institutions. "Investment in the technical future of the nation" is stressed, but individuals often refer to the investment as "expense." It is often advantageous to show graphically the returns both socially and economically to a region, state, and the nation when individuals are prepared for careers in the field of technology and by virtue of their employment return dividends to the region. The revelation of cost vs. return often provides an excellent basis for keeping the tax-paying public aware of the advantages of investing in the preparation of highly skilled personnel for this technological era. This is not a matter to be handled lightly, however, for the investment in technical education is often as much as $1,000 per student per year. On the other hand, and by contrast, the public school education provided for individuals of the same chronological age but in the liberal elements of education often approximates $600 or less per year.

Several other forms of technical education are conducted in the nation, and these are worthy of note and study. Many private technical education facilities, some of which have been in the field of technical education for many years, have been involved in the preparation of technicians prior to the strong development of public technical education. It is not the purpose of this paper to review the relative merits of the public vs. private technical education organizations. Rather it is important to note that with the critical shortage of technically trained personnel, all possible facilities are needed which will contribute to the corps of trained technicians needed in this technological era. Some colleges and universities conduct programs of technical education, but these are generally of the highly technical engineering-oriented category and/or of the agricultural technical category. At many universities, two-year agricultural technical programs are conducted and result in the granting of an associate degree. These programs enable individuals to move out immediately into occupations requiring a knowledge of both the agricultural and technical aspects of their field while at the same time they provide open end education which enables the graduate to enroll in a four-year program of agriculture with two years of transfer credit. The same procedure pertains to the two-year highly technical engineering-oriented curriculums offered by some colleges and universities. However, under the aegis of a university which offers an engineering program and at the same time a two-year technician training program, there is always the possibility that one will be regarded as of lesser status than the other. In some cases, individuals who enroll in the four-year engineering college program and who encounter some difficulty are advised to enroll in the technician training program. Psychologically, such an enrollee is at a disadvantage, and the results are appropriate and in proportion to the status and recognition which he feels he has inherited. Also, in the financing of such a university based program, problems ensue. With the many schools usually operating within the broad framework of a university, and with each of these schools competing for the rather limited dollar resources available within a university, there is little likelihood that the technical institute so operated will find ready access to the funds that it needs to conduct the kinds of programs which may be urgently needed and urgently requested by the region being served by the program of technician training. While some colleges and universities conduct excellent technician training programs, it would be unfortunate to leave the impression that location on a college or university campus automatically guarantees status and respectability. Further, problems of financial facilitation may be insurmountable in some cases and may result in stifling the program of technical education.

Sources of Funds for Technical Education Programs

Earlier in this paper it was indicated that from a variety of sources, funds may be available for conducting programs of technical education. In most cases, individuals are fully aware of the possibilities of the availability of local tax funds as well as state or county funds for conducting technical education. However, the need to consider carefully the sources of federal funds which might be provided for a variety of technical education purposes is essential. Careful study of the Vocational Education Act of 1963 will reveal that funds are available not only for reimbursing the salaries of teachers, supervisors, administrators, and others directly connected with the program of technical education, but also that funds may be used for the construction of buildings and/or for the renovation of facilities for inaugurating a program of technical education. Further, careful study of the Vocational Education Act of 1963 will disclose that the possibilities for staff improvement and growth are reflected in the provisions of the act for ancillary services which enable an institution and its cooperating teacher-education agencies to provide the kind of professional growth programs critically needed by the kinds of administrative, supervisory, and/or teaching personnel that are inducted into technical education programs. Other federal acts also provide possibilities. These include the George Barden Act, and one's interpretation of the titles of the George Barden Act may very well determine the extent to which these titles may be brought to bear upon the financial support of the program of technical education. Under Title II of the George Barden Act in which health and other paramedical areas of health instruction are considered, strong support for the development of technical programs is provided for nursing and nursing facilities, hospital, nursing home, and other health-oriented occupations. Title III of the George Barden Act has long been a valuable source of financial support for technical education and in a sense provided the pattern for further support now reflected in the Vocational Education Act of 1963. The technical education section of the George Barden Act (Title III) which placed special emphasis upon the highly technical occupations in the interest of the national defense and which provided extensive funds for equipment as well as reimbursement of salaries of a variety of kinds, did much to expand the field of knowledge with regard to area vocational education programs and the need for facilities of this type to augment all others in the training of personnel for technological fields of employment. Many other kinds of federal legislation provide opportunities for the administrator to obtain funds for the further development and improvement of programs of technical education. These federal acts include Higher Education Facilities Act, the rapidly expanding Manpower Development and Training Act, The Nurse Training Act of 1964, and even the recently passed federal legislation, The National SEA Grant College Act. This last-named legislation provides ten million dollars in fiscal 1967 for the development of programs designed to provide scientists, engineers, and technicians deemed necessary in the wide variety of technical occupations now associated with the sea.

The administrator of a technical program should have continuously at hand copies of each of the important educational acts, whether they be specifically vocational or otherwise. Frequent review of the possibilities contained in these Acts, and frequent discussions with the attorney general of the state, with the State Education Department authorities, and others will reveal many uses for which funds in these acts may be employed for developing programs of technical education.

Some Selected Factors Affecting Financing and Budgeting for Technical Education

In this section of the paper, actual dollar figures are provided. For example, figures are supplied in connection with the estimated costs for erecting and equipping a technical institute to provide instruction for 910 full-time day students as well as approximately 3,000 adults who would be attending evening, adult, and extension programs of a technical nature. The information contained herewith indicates the extent to which site must be provided and the cost of the building made a consideration of the financing operation. Each of the items is deserving of extensive discussion, but space does not permit this. References are made to specific items only in the hope that attention drawn to these items will provide additional light on characteristics of the program of finance which are usually debated widely. Amounts and percentages shown in the tables which follow serve only to indicate approximate constants which would apply in a highly industrialized region.

A cautious approach to probable costs of facilities is provided by the guidelines included in the American Vocational Association publication which discusses the need to be judicious in the choice of an architect who is familiar with the kinds of construction needed for technical education (American Vocational Association, 1963).

The $20 per square foot indicated as the cost of erecting a technical institute may be used only as an average. As recently as 1965, the U. S. Office of Education used $15 per square foot (U. S. Government Printing Office-OE-80040, 1965). Recent buildings constructed in the industrial northeast have cost as much as $27 per square foot while buildings conducted in the Carolinas have been shown to cost but half that amount. Needed in such instances is immediate and careful identification of what is included in the cost per square foot. On the one hand, all of the equipment which would ordinarily be installed by the contractor at the time of the construction is included, while on the other hand, no equipment of any kind is included in the building estimate. Upon close examination of the details, one often finds that the range of a flat constant is not so extensive as it might have first seemed.

Attention is drawn to the item under building cost estimate which refers to the "Cost of Purchasing Equipment." This is an item which often receives little if any attention in the planning and budgeting of a new institution. The actual cost of purchasing the needed equipment for shops and laboratories for a new building requires personnel, time, and dollars. This activity is represented in the table as a flat $25,000 for a $3-1/3 million project. It involves not only personnel and time but space and contractual services such as telephone, telegraph, express, heat, light, and, in some cases, actual travel to locations where equipment and other items may be seen in operation.

TABLE #1

TECHNICAL INSTITUTE TO SERVE A REGION
910 Full-Time Students (day)
3,000 Evening and Adult Students (evening)

BUILDING COST ESTIMATE

A. Site

Approximately 50 acres @ $3,000/acre $150,000
including limited site improvement

B. Erection Costs

Approximately 110,000 sq. ft. @ $20/sq. ft. $2,200,000

C. Contingency Fund

Approximately 5% of the cost of erecting the building $110,000

D. Architectural Fees

Approximately 6% of the total of items B and C $138,600

E. Estimated Equipment Costs

Approximated from similar institute laboratory and classroom facilities $710,000

F. Cost of Purchasing Equipment

Office Space, Clerical and Secretarial Assistance, Office Supplies, etc. $25,000

Approximate Total $3,333,600

CURRICULUMS OFFERED

Engineering-oriented Technical	6
Industrial Technician	4
Business-oriented	4

In specific cases when a technical institute offers only engineering-oriented technical instruction, a rule of thumb often is used. This rule of thumb indicates that approximately $5,000 per student is needed to acquire an appropriate site, erect the building, and equip it ready for occupancy. This would mean that a technical institute which would offer engineering-oriented technical programs, designed to accommodate approximately 600 students, would require very nearly $3 million for the erection of the building and for fully equipping it. Actual detailed cost analyses made after such buildings have been constructed and equipped have indicated that the rule of thumb is exceedingly close.

In instances where technologies other than the highly technical engineering-oriented variety are the concern of the administrator, other figures must be interpolated in the calculations. Thus, where business and secretarial types of technical programs are anticipated, a flat rule of thumb figure of $2,000 per student is adequate. Still further, where a second level of technician training is the concern of the administrator, still another figure used as a rule of thumb may be considered. In the training of industrial technicians, those who would normally find their way into mechanical drafting, architectural drafting, air-conditioning and refrigeration, industrial electronics and similar fields, the flat rule of thumb of roughly $4,000 per student is appropriate. Thus, with several rules of thumb including $5,000 per student, $2,000 per student, and $4,000 per student, the administrator is faced with striking an average. The anticipated enrollments in each of the major categories would affect the final selection of a flat rule of thumb figure. Hence, no attempt is made here to indicate how this final constant would ultimately work out. Each situation would require a separate calculation. In the information supplied in the following table, the actual dollars indicated are those which were used by the institution indicated in Table 1. This technical institute will soon be ready for construction. Expected occupancy is September, 1968.

The Adult, Evening and Extension Program

The offering and the conducting of such courses and curriculums as may be needed to serve personnel concerned with part-time, evening, and adult instruction are some of the several important objectives of the technical institute. It may be the intent to make this kind of instruction self-supporting, however. Fees per course, appropriate to cover the cost of instruction, materials, and other collateral costs (light, heat, janitor service, etc.) would have to be calculated and published in the catalogs and folders which describe the offerings. In general, however, the cost per course to the student would be a proportionate part of the cost charged per year of day school instruction.

Attention should be given to the matter of estimated annual recurring costs of operation and expected income as shown in Table 2. In many states, the actual cost of post-secondary technical education is divided three ways. The student pays one-third, the state pays one-third, and the school organization pays the balance. The income derived from the state and the student must be a considered part of the financial pattern for the school, and this is shown in Table 2. It should be noted that while the ongoing cost of instruction is indicated at approximately $800 per student per year for an institution of this nature, several states

TABLE #2

ESTIMATED ANNUAL RECURRING COSTS OF OPERATION AND EXPECTED INCOME

The First Year of Operation

Operating Income:	
Government Appropriations	
State	
1/3 of the cost for approximately 540 students estimated at very nearly $800 per student per year	$ 144,000
Local matching contribution	144,000
Student Fees 540 students @ $267/yr.	144,000
Federal Grants These would be made to the state and would be reflected in state reimbursement policies concerning construction costs, equipment, reimbursement of salaries, etc.	
Departmental Sales	None
Other Income	None
(Estimated) Total	$ 432,000
Operating Expenditures:	
Cost of Instruction	
Approximately 36 teaching staff and department head salaries @ approximate average of $8000	288,000
Teaching Assistants 5 @ approximately $6000	30,000
Library	
Cost of acquisitions as recommended by American Library Association 540 @ $2.50/student/year	1,350
Publications and Technical Journals	500
Student Services	
Guidance and Counseling	10,000
Cost of "Recruiting"	2,500
Publications, Catalogs, etc.	2,500
General Expense	
Instructional materials, telephone, freight and express, postage, mimeographing, printing, etc. 540 students @ $20/year (first year)	10,800
Plant Operation	
Heat, light, power, building and grounds, maintenance, water, repairs, etc.	28,350
General Administration	
Salaries of Administrative and Supervisory Staff 4 @ average of $11,000	44,000
Non-professional employees 6 @ Average of $3000	18,000
Building Utility Staff 2 @ $3000	6,000
(Estimated) Total First year of operation	$ 442,000

TABLE #2--Continued

The Second Year of Operation

Operating Income:	
Government Appropriations	
State	
1/3 of the cost of 910 students estimated at $800 per student/year	$ 242,000
Local matching contribution	242,000
Student Fees 910 students @ $267/yr. (approximately)	242,970
(Estimated) Total	$ 726,970
Operating Expenditures:	
Cost of Instruction	
Approximately 60 teaching staff and department head salaries @ approximate average of $8500 This includes an increment for the teaching staff of the previous year	510,000
Teaching Assistants 7 @ $6000	42,000
Library	
910 @ $2.50/year/student	2,275
Publications and Technical Journals	800
Student Services	
Guidance and Counseling	10,500
Cost of Recruiting, Travel, Publications	5,000
General Expense	
Instructional materials, telephone, express, postage, mimeographing, printing, etc. Average: 910 students @ $20/student	18,200
Supplies for laboratories (advanced students)	10,000
Plant Operation	
Heat, light, power, maintenance of building and grounds	38,000
General Administration	
Salaries of Administrative and Supervisory Staff 4 @ $11,600 average (includes annual increment for staff employed last year)	46,400
Non-professional employees 8 @ $3200 average	25,600
Building Utility Staff 4 @ $3200 average	12,800
(Estimated) Total Second year of operation and thereafter	$ 721,575

by virtue of careful scheduling, prudent class and laboratory scheduling and use of facilities have operated and are still operating programs of technical education below the cost figure of $600 per student per year. Other states, in their beginning phases of technical operation, are operating as high as $1,100 to $1,200 per student per year. Rutgers University (Merlo and Walling, 1964) has provided a guide to classroom and laboratory scheduling. Small classes, high salaries, lack of efficient faculty assignment and facility utilization, lack of long-range planning and other factors, Rutgers University points out, are involved in these higher figures. Each would have to be considered separate and apart from the others to determine steps necessary to reduce the costs of operation. All technical education is not conducted on the post-high school level. Much technical education has been conducted in Connecticut, Massachusetts, New York, and New Jersey (Smith, 1963) on the secondary level for many years, and many states have developed highly effective secondary technical education programs. Hence, for the kind of institution which might be needed to provide technical education on the secondary level and to meet the needs of secondary school youth who plan to prepare for occupations that are currently available (and presumably will be available to them upon graduation from the 12th grade), additional information is provided concerning the costs of construction of a vocational-technical school which conceivably might be constructed and equipped to provide the required technical curriculums. (See Table 3.)

The Future in Financing of Technical Education

As the need for technical education continues to manifest itself throughout the nation, it must be contingent upon each educational agency, on its appropriate and chosen level, to assume the responsibility of providing adequate technical educational services and facilities for the preparation of youth and adults for the fields afforded by our phenomenal technological growth. The patterns of finance will vary of course, but there is a discernible trend now toward regionalization of services and the merging of forces and intelligence to provide the kinds of support and guidance needed for technical education. In the next decade, indications point to the further regionalization and building of merged county units. Financing of technical education, whether on the secondary, post-secondary, or college level, will reflect the understandings held by the educational community to provide technical education for individuals at the time when these individuals are motivated, see the meaningfulness of the instruction, and have a need to prepare for a technical occupation. In the future, financing of technical education will need to be more cognizant of the demonstrated needs of individuals and correspondingly to place less emphasis upon decisions to provide "certain kinds and levels" of technical education, especially where these decisions have been arrived at in "swivel chair" or "ivory tower" fashions and with little reference to facets of the individual noted above. Democracy in decision making, innovation in program design, creativeness in buildings and equipment matters will require that the financial handling of technical education be accompanied by a high level of educational knowledge, educational philosophy, and attention to the social and economic implications of technical education for our people and our nation.

TABLE #3

Financial Requirements for the Purchase and Cost of Developing Site; Installing Utilities; Erecting, Equipping Buildings; Architect's Fee; Department of Public Works' Fee; Contingency Fund for a Proposed New Regional Vocational-Technical School Serving the Lower Naugatuck Valley, Connecticut.

---

370 Full-time all day students (Day Program)
800 Adult and part-time students (Evening Program)
8 Full-time curriculums (grades 10, 11, and 12) including:
  Industrial Electronics
  Mechanical Drafting and Design
  Tool and Diemaking and Design

Site Expenditure		
Estimated cost of site (minimum 25 acres)		$ 100,000
Erection Expenditures		
Estimated cost of school buildings, based on 74,065 sq. ft. of floor area at $20 per sq. ft. including utilities and site development	$ 1,481,300	
Estimated Contingency Fund based on 15% of the estimated cost of buildings including utilities and site development ($1,481,300)	222,195	
Estimated Architect's and Engineer's fees based on 5.37% of the estimated cost of buildings including utilities, site development and contingency fund ($1,703,495)	91,477	
Estimated Department of Public Works fee based on 2½% of the estimated cost of buildings including utilities, site development and contingency fund ($1,703,495)	42,587	
Total Erection Expenditures		$ 1,837,559
Equipping Expenditures		
Estimated cost of equipment for Vocational Shops, Laboratories, Classrooms, Administrative, Physical Education-Assembly, Cafeteria, and Custodial Service Areas	587,747	
Estimated Department of Public Works fee for the purchasing of equipment based on 2½% of the estimated cost of equipment ($587,747)	14,694	
Total Equipment Expenditures		602,441
Estimated Grand Total Cost of School Plan Including Equipment		$ 2,540,000

REFERENCES

American Vocational Association. Developing Educational Specifications for Vocational and Practical Arts Facilities. Washington, D. C.: The Author, 1963, 48 pp.

Corbally, John E. School Finance. Boston: Allyn and Bacon, 1962, 288 pp.

Merlo, Frank J. and Walling, W. Donald. Guide for Planning Community College Facilities. New Brunswick, N. J.: Rutgers State University, 1964, 40 pp.

National Education Association. Committee on Educational Finance. Local, State and Federal Partnership in School Finance. Proceedings of the Ninth National Conference on School Finance, Chicago, Ill., April 3-5, 1966. Washington, D. C.: The Author, 1966.

National Education Association. Partnership in School Finance. Washington, D. C.: The Author, 1966, 165 pp.

Smith, Harold T. Education and Training for the World of Work. Kalamazoo, Mich.: W. E. Upjohn Institute for Employment Research, 1963, 165 pp.

U. S. Office of Education. Basic Planning Guide for Vocational and Technical Education Facilities. GPO, 1965, 32 pp. OE-80040.

PART V

BIBLIOGRAPHY

A BIBLIOGRAPHY ON TECHNICAL EDUCATION

by

David L. Larimore*

AFL-CIO. Department of Research. *Labor Looks at Automation*. Washington, D. C.: The Author, 1956.

American Council on Education. *American Junior Colleges*. 5th Edition. Washington, D. C.: The Author, 1960.

American Society for Engineering Education. *Characteristics of Excellence in Engineering Technology Education*. Urbana, Ill.: The Author.

______________.** *Technical Career Opportunities in Engineering Technology*. Urbana, Ill.: The Author, 1964.

______________. Technical Institute Division. *The Engineering Technician*. New York: McGraw-Hill, 1954.

"American Society of Engineering Education Committee Report on Student Selection and Guidance," *Technical Education News*, 1956. (Special Issue.)

American Vocational Association. *Area Vocational Education Programs*. Washington, D. C.: The Author.

Arizona State Employment Service. *Arizona's Manpower Challenge of the 60's*. Phoenix, Ariz.: The Author, 1960.

Armsby, Henry H. *Co-operative Education in the United States*. GPO, 1954. Bulletin 11.

______________. *Engineering and Scientific Manpower*. GPO, 1960.

Arnold, Walter M. "Area Vocational Education Programs," *School Life* (January 1960).

Barlow, Melvin L. and Schill, William J. *The Role of Mathematics in Electrical-Electronic Technology*. Los Angeles, Calif.: University of California, 1962.

Beatty, H. Russell. "The Place of General Studies in a Technical Institute Curriculum," *Technical Education News*, 13:3 (May 1954).

---

*Mr. Larimore is a Research Associate, The Center for Vocational and Technical Education, The Ohio State University.

**Author same as for preceding citation.

Benton, William. "The Soviet Union's Specialized Vocational Schools," *School Shop Magazine* (September 1956).

Bogue, J. P. *The Community College*. New York: McGraw-Hill, 1950.

Booher, Edward E. "Survey of General Education in Technical Institutes," *Technical Education News*, 14:1, 1954. (Special Issue.)

Boss, T. "How Much Does It Cost to Develop an Instrument Laboratory?", *Technical Education News* (May 1959).

Borow, Henry. *Man in a World at Work*. Boston: Houghton Mifflin, 1964.

Bowen, G. H. and Kettering, C. F. *A Short History of Technology*. West Orange, N. J.: Thomas Alva Edison Foundation, 1954.

Brady, James T. *Team Work in Technology: Managing Technical Manpower*. Scarsdale, N. Y.: Technician Manpower Associates. (No date.)

Brandon, George L. *Vocational Education in a Robot Revolution*. East Lansing, Mich.: Michigan State University College of Education, 1957.

——————. *Twin Cities Technician*. East Lansing, Mich.: Michigan State University College of Education, 1958.

California State Department of Education. *A Directory of Occupation-Centered Curriculums in California Junior Colleges and Schools for Adults*. Sacramento, Calif.: The Author.

——————. *A Study of Technical Education in California*. Sacramento, Calif.: The Author, 1959.

——————. *California Schools and the Courses They Offer That Are Approved for Veterans' Training*. Sacramento, Calif.: The Author.

——————. *Mathematics and Science Competencies for Technicians*. Sacramento, Calif.: The Author, 29:12 (December 1960).

——————. *Science and Engineering Technician Study*. Sacramento, Calif.: The Author, 1964.

——————. *Technical Education for Industry*. Sacramento, Calif.: The Author, 1957.

——————. *Technicians in Agriculture*. Sacramento, Calif.: The Author. (No date.)

——————. *Trends and Developments in Technical Education in California Junior Colleges*. Sacramento, Calif.: The Author, 1958.

Carson, R. G., Jr. *Survey of Ranks, Titles, and Salaries in Technical Institutes*. Raleigh, N. C.: North Carolina State College, 1961. (Mimeographed.)

"The Changing Pattern of Military Skills," *Employment Security Review* (July 1963).

Clark, Harold F. *Classrooms in the Factories*. New York: Columbia University Teachers College Press, 1958.

Coe, B. D. *Sociological Implications for Technician Training*. (Address to American Technical Education Association (ATEA) Convention, Los Angeles, California.) Delmar, N. Y.: ATEA, December 1960. (Mimeographed.)

Connecticut State Employment Service. *Skills for the Future*. (Series.) Hartford, Conn.: Connecticut Labor Department. 1961-62.

Cummings, Kimball C. "Characteristics of the Technician as an Engineering Aid," *Journal of Engineering Education* (January 1957).

Dauwalder, Donald D. *Education and Training for Technical Occupations*. Parts 1 and 2. Los Angeles, Calif.: City School District, Division of Extension in Higher Education, 1961.

Detroit Board of Education. *Report of a Survey of the Need for Technicians in the Automotive Manufacturing Industry in the Detroit Metropolitan Area*. Detroit, Mich.: The Author, 1962.

De Witt, Nicholas. *Education in Professional Employment in the U.S.S.R*. GPO, 1961.

Dunn, William A. "Pennsylvania State Survey of Evening Technical Students," *Technical Education News*, 21:3 (January 1962).

"ECPD Technical Institute Committee Now Ready to Act on Applications for Curriculum Inspection," *Technical Education News*, 4:3 (April 1945).

"Education and Training of Technicians," *Monthly Labor Review* (November 1964).

Educational Policies Commission. *Manpower and Education*. Washington, D. C.: National Education Association, 1956.

Eells, W.C. *Present Status of Junior College Terminal Education*. Washington, D. C.: American Association of Junior Colleges, 1941.

Electronic Industries Association. *Electronic Training in Your Community*. Washington, D. C.: The Author.

______________. *Industry Advisory Groups*. Washington, D. C.: The Author.

Elonka, Steve. "Instrumentation and Process Control." Power (September 1961).

Emerson, Lynn A. Industrial Education in a Changing Democracy. Ithaca, N. Y.: Cornell University School of Industrial and Labor Relations, 1955.

______________. Technician Training Beyond the High School. Raleigh, N. C.: North Carolina State Board of Education, Vocational Materials Laboratory, 1962.

Engineers' Council for Professional Development. "Report of the Recognition Committee," (31st Annual). New York: The Author, 1963.

Engineers Joint Council. The Training, Placement, and Utilization of Engineers and Technicians in the Soviet Union. New York: The Author.

Federal Aviation Agency. The Electronic Technician in FAA. Washington, D.C. The Author.

Fields, Ralph R. The Community College Movement. New York: McGraw-Hill, 1962.

Florida State Department of Education, Division of Vocational and Adult Education. Technical Education Evaluative Instrument in Technical Education in Florida's Community Junior Colleges. Tallahassee, Fla.: The Author.

______________. Technicians for Florida Industries. Tallahassee, Fla.: The Author, 1959.

Flesher, W. R. Public Vocational-Technical Education in Oregon. Columbus, Ohio: School Survey Service, 1958. Report of a survey made for the Oregon State Board of Education.

Georgia Employment Security Agency. Georgia Skill Study--Summary Report. Atlanta, Ga.: Georgia Department of Labor, 1963.

Graney, Maurice R. The Technical Institute. New York: The Center for Applied Research in Education, 1964.

Instrument Society of America. The Instrumentation Technician. Hollywood, Calif.: Grantham School of Electronics, 1961.

Harbison, Frederick and Myers, Charles A. Education, Manpower, and Economic Growth. New York: McGraw-Hill, 1964.

Hardman, William E. In-Plant Training. (Complete Management Library, Vol. 21.) Waterford, Conn.: Prentice-Hall, 1964.

Harrington, Gordon M. Technicians for Connecticut Industry. Hartford, Conn.: State Department of Education, 1957.

Harris, Norman C. "Technician Education in the Community College," *Junior College Journal* (December 1954).

Harting, W. M. and Brush, G. W., Jr. *How to Choose Your Technical Institute*. Monograph 105. Cambridge, Mass.: Bellman Publishing Co., 1960.

Henneman, H. A. "Agricultural Technician Training is No Fantasy," *American Vocational Journal*, 37:3 (March 1962).

Henninger, G. Ross. *The Technical Institute in America*. New York: McGraw-Hill, 1959.

Holderman, K. L. "Some Facts About our Technical Institute Instructors," *Technical Education News* (April 1952).

Institute for the Certification of Engineering Technicians. *The Certification of Engineering Technicians*. Washington, D. C.: The Author, 1962.

Jenkins, Harry E. "The Accreditation of Junior Colleges," *American Junior Colleges--1960*. Washington, D. C.: American Council on Education, 1960.

Johnson, L. V. "Industrial Progress of Southern Tech's Graduates," *Technical Education News*, 1954. (Special Issue.)

Kansas City (Missouri) School District. *Skilled and Technical Workers in Greater Kansas City*. Kansas City, Mo.: The Author, 1958.

Kansas State Board for Vocational Education. *The Training Needs of Highly Skilled Technicians in 23 Selected Manufacturing and Processing Firms in Kansas*. Topeka, Kans.: The Author, 1959.

Kirker, Robert E. "Automation and Vocational Education," *Industrial Arts and Vocational Education Magazine* (June 1957).

Korl, Alexander G. *Soviet Education for Science and Technology*. New York: John Wiley and Sons, 1957.

Krash, Otto. "The Technical Institute and American Education," *Junior College Journal* (November 1954).

Kwish, H. *Apprenticeship in America*. New York: W. W. Norton and Co., 1958.

Manufacturing Chemists' Association. *Report on Chemical Technician Training*. Washington, D. C.: The Author, 1964.

McClure, W.P. and others. *Vocational and Technical Education in Illinois: Tomorrow's Challenge*. Urbana, Ill.: Bureau of Educational Research, College of Education, University of Illinois, 1960.

McVean, James E. *The Technical Institute Evening Program*. Ithaca, N. Y.: Cornell University, 1953. Unpublished Master's Thesis.

Medsker, Leland L. The Junior College--Progress and Prospect. New York: McGraw-Hill, 1960.

Meier, Paul T. "Let's Be More Consistent," Technical Education News, 20:2 (November 1960).

Merson, Thomas B. "What is Higher Education?" Technical Education News, 21:1, 1961. (Special Issue.)

Metz, D. C. "Fifth Survey of Engineering Technician Programs: Enrollments and Graduates--1959, 1960," Technical Education News, 20:2 (November 1960).

Meyer, A. M. and Hennelly, Robert J. The Student Personnel Problem. 55th Yearbook of the National Society for the Study of Education. Chicago: University of Chicago Press, 1956.

Meyer, Mary. "Jobs and Training for Women Technicians," Occupational Outlook Quarterly (December 1961).

Michigan Department of Public Instruction. The Profile of Michigan Manpower Training Needs of the 1960's. Lansing, Mich.: The Author, 1962.

______________. Division of Vocational Education. Industrial Technical Education in Michigan. Lansing, Mich.: The Author, 1959.

Michigan State University. College of Education. Explorations in Research Design: Curricula for Technicians. East Lansing, Mich.: The Author.

Middlesex County Board of Education of the Vocational Schools. Survey of the Need for Vocational-Technical Education in Middlesex County, New Jersey. New Brunswick, N. J.: The Author, 1960.

Mississippi State College, Department of Industrial Education. Development of Technical Education in Mississippi Public Junior Colleges. (Report of the 1956 Junior College Conference.) State College, Miss.: The Author, 1956.

Mitchell, Roy L. "Rebuttal to Let's Be More Consistent," Technical Education News, 20:5 (June 1961).

Montgomery Junior College. Technical and Semi-Professional Occupational Survey. Rockville, Md.: The Author, 1963.

National Association of Manufacturers, Education Department. Your Opportunities in Industry as a Technician. New York: The Author, 1957.

National Committee for the Development of Scientists and Engineers. Answer Your Engineering Manpower Problems. Washington, D. C.: The Author. (No date.)

National Council of Technical Schools. *Career Opportunities for the Engineering Technician*. Washington, D. C.: The Author, 1959.

______. *Directory of Technical Institute Courses*. Washington, D. C.: The Author, 1959.

National Education Association. *Current Issues in Higher Education: Higher Education in an Age of Revolution*. Washington, D. C.: The Author, 1962.

______. National Commission on Teacher Education and Professional Standards. *The Education of Teachers*: *Certification*. Washington, D. C.: The Author.

National Home Study Council. *Some of the Technical Courses Offered by Accredited Private Home Study Schools*. Washington, D. C.: The Author. (No date.)

National Manpower Council. *A Policy for Skilled Manpower*. New York: Columbia University Press, 1954.

______. *Improving the Work Skills of the Nation*. New York: Columbia University Press, 1955.

National Science Foundation. *The Long-Range Demand for Scientists and Technical Personnel*. GPO, 1961.

______. *Scientific and Technical Manpower Resources*. GPO, 1964.

______. *Soviet Professional Manpower*. GPO, 1955.

______. *Scientists, Engineers, and Technicians in the 1960's--Requirements and Supply*. GPO, 1963.

New Jersey Department of Labor and Industry. *Occupational Training Needs Survey*. (Series.) Trenton, N. J.: The Author. 1962-1964.

New York State Education Department. *The Organization and Administration of Vocational-Technical Courses in Secondary Schools*. Albany, N. Y.: The Author, 1950.

______. Division of Industrial Education. *Syllabus in Technical Subjects*: *Structural Drafting and Design*. Albany, N. Y.: The Author.

New York State Department of Labor. Division of Research and Statistics. *Technician Manpower in New York State*. Albany, N. Y.: The Author, 1964.

______. *Jobs 1960-1970--The Changing Pattern*. Albany, N. Y.: The Author, 1960.

__________. *Manpower Requirements in Electronics Manufacturing*. Albany, N. Y.: The Author, 1960.

North Carolina Employment Security Commission. Bureau of Employment Security Research. *North Carolina's Opportunity*. Raleigh, N. C.: The Author.

__________. *North Carolina Study of Technical and Skilled Manpower*. Raleigh, N. C.: The Author, 1962.

North Carolina State Board of Education. Department of Curriculum Study and Research. *A Guide to Further Development of Industrial Education Centers in North Carolina*. Raleigh, N. C.: The Author, 1962.

Nosow, Sigmund and Form, W. H. *Man, Work, and Society*. New York: Basic Books, Inc., 1962.

Pace, Michael. "The Indispensable Man," *School Shop Magazine* (November 1957).

Pennsylvania Department of Labor and Industry. *Manpower Skill Requirements and Training Needs*. (Series.) Harrisburg, Pa.: The Author, 1958.

Rhode Island Department of Employment Security. *Manpower Resources in Rhode Island--1962-65*. Providence, R. I.: The Author, 1961.

Roanoke Chamber of Commerce. *A Technical Institute in Roanoke to Serve Western Virginia*. Roanoke, Va.: The Author, 1957.

Rodes, Harold P. "Building Curricula for Technical Education," *Junior College Journal* (September 1954).

__________. "The Needs of California Industries for Employees with Technical Institute Type Training," *Technical Education News* (June 1952).

Roger, Sidney. "The Junior College in an Age of Technological Change," *Junior College Journal* (January 1961).

Rogers, William W. "Technicians in Industry: Placement, Progress and Salary," *Technical Education News*, 1954. (Special Issue.)

Rosen, Howard. "Technicians in the Labor Force of Russia and America," *Monthly Labor Review, U. S. Department of Labor* (January 1958).

Schultz, G. P. and Baldwin, G. B. *Automation: A New Dimension to Old Problems*. Washington, D. C.: Public Affairs Press, 1955.

Serbein, Oscar N. *Educational Activities of Business*. Washington, D. C.: American Council on Education, 1961.

Singer, Charles and others. (Editors.) *A History of Technology*. London: Oxford at the Clarendon Press, 1956. (5 volumes.)

"Sixth Survey of Engineering Technician Programs--Enrollments and Graduates--1960-61," *Technical Education News*, 21:1, 1956. (Special Issue.)

Slater, Lloyd E. "Instrumentation and Automation Control," *Technical Education News* (October 1957).

Smith, Harold T. *Education and Training for the World of Work*. Kalamazoo, Mich.: The W. E. Upjohn Institute for Employment Research, 1963.

Smith, Leo F. "Annual Survey of Technical Institutes for 1955-56," *Technical Education News* (September 1956).

Smith, Leo F. and Lipsett, Lawrence. "Can Technical Institute Graduates Succeed in Engineering Colleges?", *Journal of Engineering Education* (June 1954).

————————. *The Technical Institute*. McGraw-Hill, 1956.

Society for the Promotion of Engineering Education. *A Study of Technical Institutes*. Lancaster, Pa.: Lancaster Press, 1931. (Formerly called American Association for Engineering Education.)

Statt, C. J. "Automation and Its Demands on the Technical Institutes," *Technical Education News*, 1956. (Special Issue.)

Stockton, Frank T. *Scientists and Engineers in Greater Kansas City: A Survey of Demand and Supply Factors*. Topeka, Kans.: Department of Labor, June 1957.

Syracuse Board of Education. *Industrial Technicians for Greater Syracuse*. Syracuse, N. Y.: The Author, 1960.

Technician Education Yearbook, 1963-64. Ann Arbor, Mich.: Prakken Publications, Inc., 1963.

Technician Education Yearbook, 1965-66. Ann Arbor, Mich.: Prakken Publications, Inc., 1965.

"Technician Lag Intensifies Crisis," *Engineering and Scientific Manpower Newsletter*, 132 (April 1962).

Texas Agricultural and Mechanical College. Engineering Extension Service. *Survey of Technical Occupations*. College Station, Tex.: The Author, 1959.

————————. *Technician Requirements in Principal Industrial Areas of Texas*. College Station, Tex.: The Author, 1959.

University of Alabama. Bureau of Educational Research. Area Vocational Education Programs for "Technicians." University, Ala.: The Author, 1959.

University of Delaware. Bureau of Economic and Business Research and Delaware Employment Security Commission. Area Skill Survey--State of Delaware. Wilmington, Del.: Delaware Department of Labor and Industrial Relations, 1963.

University of Florida. Inventory of Engineers and Scientists Employed in Florida in January 1958 and Employment Projected to 1974. Jacksonville, Fla.: Science and Engineering Center Study, April 1960.

University of Illinois. Bureau of Educational Research. Vocational and Technical Education in Illinois. Urbana, Ill.: The Author, 1960.

U. S. Department of Health, Education, and Welfare, Office of Education. Administration of Vocational Education--Rules and Regulations. GPO, 1958.

____________. An Annotated Bibliography of Surveys and Studies in Vocational-Technical Education. GPO, 1961.

____________. Annual Reports of State Boards for Vocational Education--Fiscal 1960. GPO, 1962.

____________. Area Vocational Education Programs. GPO, 1960.

____________. Chemical and Metallurgical Technologies. GPO.

____________. Civil and Highway Technology. GPO.

____________. Determining Requirements for Development of Technical Abilities Through Extension Courses. GPO, 1961.

____________. Directory of Schools Offering Technical Education Programs Under Title VIII of the National Defense Education Act of 1958, Fiscal Year 1964. GPO, 1965.

____________. Education in the U.S.S.R. GPO, 1957.

____________. Electrical and Electronic Technology. GPO, 1959.

____________. Electrical Technology--Suggested Curriculum, Course Outlines, Laboratory Layouts, and Equipment Lists. GPO, 1960.

____________. Engineering Enrollments and Degrees, 1959. GPO, 1960.

____________. Guide to Organized Occupational Curriculum in Higher Education. GPO, 1962.

____________. Mechanical Drafting and Design Technology. GPO, 1959.

____________. *Mechanical Technology Design and Production*. GPO, 1962.

____________. *Meeting Manpower Needs for Technicians: Report of National Conference on Vocational-Technical Education*. GPO, 1957.

____________. *National Conference of State Supervisors of Title VIII Programs*. GPO, 1960.

____________. *Occupational Criteria and Preparatory Curriculum Patterns in Technical Education Programs*. GPO, 1962.

____________. *Organized Occupational Curriculums, Enrollments and Graduates*, 1957. GPO, 1959.

____________. *Organized Occupational Curriculums in Higher Education*. GPO, 1961.

____________. *President's Committee on Education Beyond the High School: Second Report to the President*. GPO, 1957.

____________. *Progress in Title VIII Programs, National Defense Education Act 1958, Fiscal Year 1963*. GPO, July 1964.

____________. *Regulations for the Administration of Title VIII, National Defense Education Act of 1958*. GPO, 1959.

____________. *Report on the National Defense Education Act, Fiscal Year Ending June 30, 1960*. GPO, 1961

____________. *Report on the National Defense Education Act, Fiscal Year Ending June 30, 1959*. GPO, 1960.

____________. *Suggested Criteria for Establishing Technical Education Programs*. GPO, 1961.

____________. *Suggestions to States in Promoting, Organizing, Operating, and Appraising Programs--Area Vocational Education Programs Under Title VIII, National Defense Education Act of 1958*. GPO, 1959.

____________. *Teacher Competencies in Trade and Industrial Education*. GPO.

____________. *Technician Training Beyond the High School*. GPO.

____________. *The Mobility of Electronic Technicians, 1940-1952*. GPO, 1954.

____________. *Vocational-Technical Education for American Industry*. GPO, 1958.

____________. *Vocational-Technical Training for Industrial Occupations*. GPO, 1944.

U. S. Department of Health, Education, and Welfare, Office of Vocational Rehabilitation. An Introduction to Vocational Rehabilitation Process. GPO.

U. S. Department of Labor. Manpower--Challenge of the 1960's. GPO, 1960.

_____________. Manpower Report of the President and a Report on Manpower Requirements, Resources, Utilization, and Training by the U. S. Department of Labor. The Author, March 1965.

_____________. Manpower Research in Training Under the Manpower Development and Training Act of 1962. A Report of the Secretary of Labor transmitted to Congress, March 1963. GPO, 1963.

_____________. Bureau of Apprenticeship and Training. Apprenticeship and Training Standards for Draftsmen. GPO, 1960.

_____________. Bureau of Apprenticeship and Training. The Training of Workers in American Industry. GPO, 1964.

_____________. Bureau of Employment Security. Current Labor Market for Scientists, Engineers, and Technicians. GPO, 1965.

_____________. Bureau of Employment Security. Selected Occupations Concerned with Atomic Energy. GPO, 1961.

_____________. Bureau of Employment Security. Technical Occupations in Research Design and Development. GPO, 1961.

_____________. Bureau of Labor Statistics. Employment in Atomic Energy Field--a 1960 Occupational Survey. GPO, 1961.

_____________. Bureau of Labor Statistics. Employment Outlook for Technicians. Washington, D. C.: Veterans Administration, 1958.

_____________. Bureau of Labor Statistics. Employment of Scientific and Technical Personnel in Industry, 1962. GPO, 1964.

_____________. Bureau of Labor Statistics. The Mobility of Electronic Technicians. GPO, 1954.

_____________. Bureau of Labor Statistics. "Technician Occupations," Occupational Outlook Handbook. GPO.

_____________. Office of Manpower, Automation, and Training. Formal Occupational Training of Adult Workers--Extent, Nature, and Use, April 1963. GPO, 1964.

_____________. Women's Bureau. Careers for Women as Technicians. GPO, 1961.

U. S. Panel of Consultants on Vocational Education. *Education for a Changing World of Work*. GPO, 1964. Also *Appendix I*: *Technical Training in the United States*, 1964.

U. S. President's Committee on Higher Education. *Higher Education for American Democracy--Establishing the Goals*. GPO, 1947.

U. S. Senate. *Hearings Before the Subcommittee on Education of the Committees on Labor and Public Welfare*, May 27, 28, and 29, 1963. 88th Cong., 1st Sess. GPO.

Utah Department of Employment Security. *Report of Utah's Technical Manpower Survey for Training Requirements*. Salt Lake City, Utah: The Author, 1958.

Van Zeeland, Fred J. "Desirable Characteristics of a Technical Institute Instructor," *Technical Education News* (January 1952).

Venn, Grant. *Man, Education, and Work*. Washington, D. C.: American Council on Education, 1964.

Veterans Administration. *Employment Outlook for Technicians*. Washington, D. C.: The Author, 1958.

Virginia State Department of Education. Division of Vocational Education. *A Compendium of Technical Training for Electronic Technicians*. Richmond, Va.: The Author.

Walker, Eric A. "Automation and Education," *Junior College Journal*, 1956.

Ward, P. *Terminal Education in the Junior College*. New York: Harper, 1947.

Werwath, Earl O. *The Role of the Engineering Technician on the Manpower Team*. Morgantown, West Va.: Engineering Experiment Station, 1957.

Wickenden, W. E. and Spahr, R. H. *A Study of Technical Institutes*. Lancaster, Pa.: Society for the Promotion of Engineering Education, 1931.

Wilcox, Glade. "A Challenge of Automation to Practical Education," *School Shop Magazine* (June 1957).

Williford, E. Allen. "The Engineering Technician--His Role in Industry and National Defense," *Journal of Engineering Education* (January 1957).

Wisconsin State Board of Vocational and Adult Education. *Technical Institute Programs in Wisconsin--and General Standards*. Madison, Wisc. The Author, 1958.

Wisconsin State Employment Service. Wisconsin Manpower Outlook, 1961-1966: Managerial Professional, Semiprofessional Occupations. Madison, Wisc.: The Author, 1964.

Wolfbein, Seymour L. The Changing Geography of American Industry. Washington, D. C.: U. S. Department of Labor. (Multilithed paper dated October 2, 1961.)

Wood, Herbert S. A Study of Technical Education in California. Sacramento, Calif.: California State Department of Education, 1959.

PART VI

REVISED MATERIALS

REVISED INFORMATIONAL RESOURCES

by

I. E. Valentine

Part VI of this publication consists of informational resources which are revisions of similar content in the original Compilation of Technical Education Materials. These new and revised materials are presented under the same headings and in the same order that they appeared in the original compilation.

The arrangement is as follows:

The Student

Secondary School Pre-Employment Technical Education Enrollments in Title III Programs in the United States--Fiscal Year 1965

Post-Secondary Pre-Employment Technical Education Enrollments in Title III Programs in the United States--Fiscal Year 1965

Percent of Growth for Technical Education by Kind of Institution and by Year from 1959 Through 1964

Actual and Projected Enrollments and Percentages for Vocational and Technical Education from 1964 Through 1975

Total State Enrollments in Title III Technical Education Programs for 1963 and 1965

Rationale and Need

The Number of Institutions Offering Technical Education Training Programs by State and by Institution Type

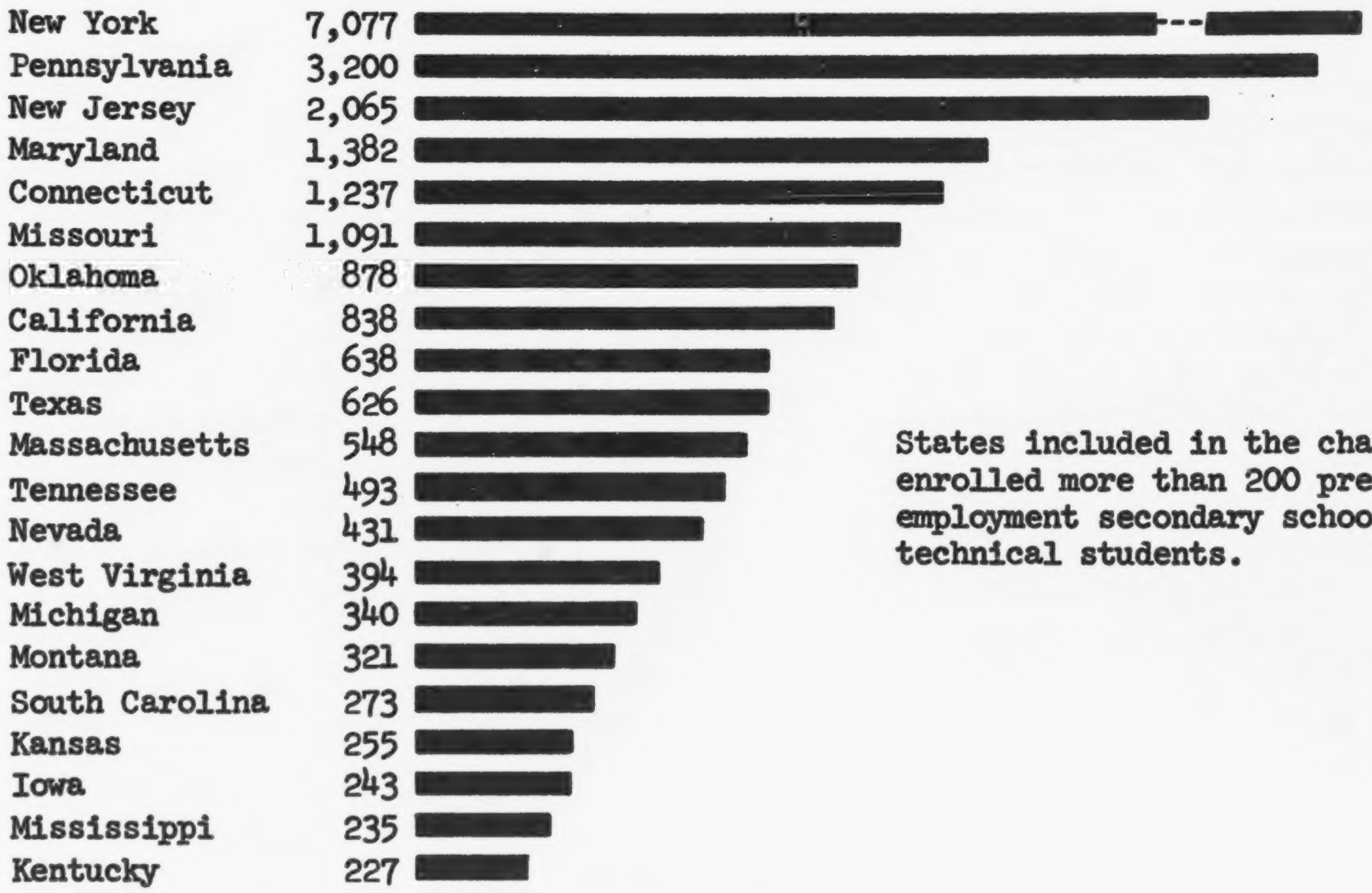
Programs and Curriculum

Distribution of Subject Matter by Year for a Two-Year Post High School Technical Education Curriculum

Facilities and Equipment

Facility Needs to Accommodate Projected Enrollments for Vocational and Technical Education

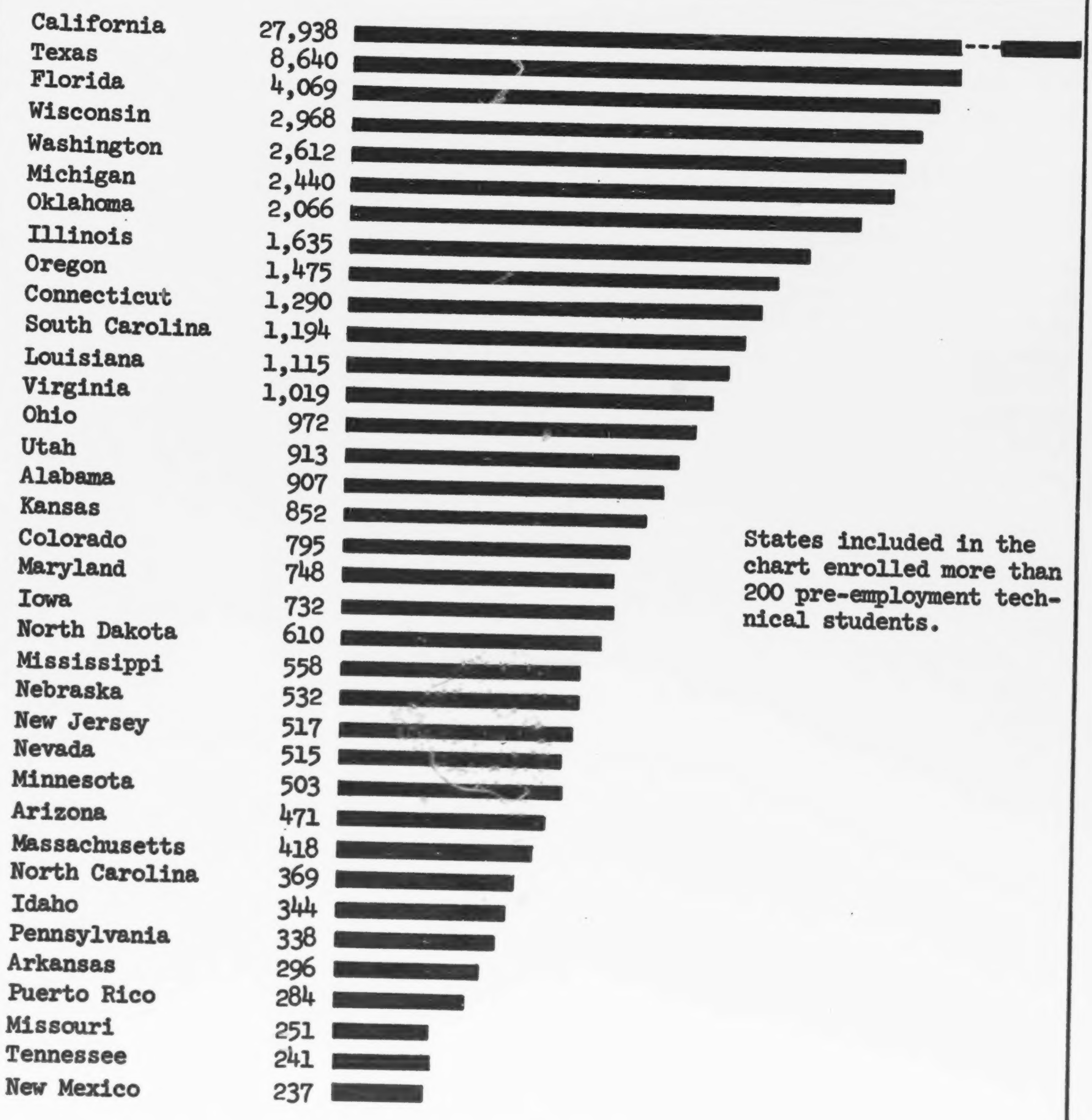
SECONDARY PRE-EMPLOYMENT TECHNICAL EDUCATION ENROLLMENTS IN TITLE III PROGRAMS IN THE UNITED STATES - Fiscal Year 1965



States included in the chart enrolled more than 200 pre-employment secondary school technical students.

Source: U. S. Office of Education - Data taken from State Reports, subject to verification.

POST-SECONDARY PRE-EMPLOYMENT TECHNICAL EDUCATION ENROLLMENTS IN TITLE III PROGRAMS IN THE UNITED STATES - Fiscal Year 1965



States included in the chart enrolled more than 200 pre-employment technical students.

Source: U. S. Office of Education - Data taken from State Reports, subject to verification.

PERCENT OF GROWTH FOR TECHNICAL EDUCATION BY KIND OF INSTITUTION BY YEAR FROM 1959 THROUGH 1964

Percent of Total Technical Enrollment by Year

Kind of Institution	1959	1960	1961	1962	1963	1964
Comp. H. S.	12.9	22.3	15.3	15.2	11.4	12.2
Voc.-Tech. School	0	5.2	11.3	13.5	19.4	14.9
Technical H. S.	10.2	9.5	11.8	11.5	9.3	8.6
Voc.-Trade School	37.1	24.3	12.4	7.9	6.4	6.5
Tech. Institute	14.4	5.5	9.3	6.7	7.5	9.1
Comm.-Jr. College	18.9	28.5	34.6	40.0	40.4	41.5
Four Year College	2.3	3.1	4.4	4.6	4.7	6.4
State Bd. for Voc. Ed.	3.9	.1	.9	.6	.9	.7
Other	.3	1.5	-	-	-	.1
Total Enrollment	48,564	101,279	122,952	148,920	184,595	221,241

Source: Percentage computed from Data-Technical Education Yearbook 1965-66. Prakken Publications, Inc., Ann Arbor, Michigan, 1965. Chart No. IV, Enrollment by Kinds of Schools, page 97.

ACTUAL AND PROJECTED ENROLLMENTS AND PERCENTAGES
VOCATIONAL AND TECHNICAL EDUCATION

	1964		1965		1966		1970		1975	
Total Enrollments and Percentages	4,566,390	100.0	5,430,611	100.0	5,789,520	100.0	9,676,415	100.0	14,000,000	100.0
Enrollment by Type of Training Program	**Enrollment**	**%**	**Enrollment**	**$**	**Enrollment**	**%**	**Enrollment**	**%**	**Enrollment**	**%**
Agriculture	860,605	19.0	887,529	16.0	868,428	15.0	1,064,406	11.0	1,230,000 1/	9.0
Distribution and Marketing	334,126	7.0	333,342	6.0	405,266	7.0	870,875	9.0	1,440,000 2/	10.0
Health	59,006	1.0	66,772	1.0	173,686	3.0	677,350	7.0	1,450,000 2/	10.0
Home Economics	2,022,138	44.0	2,098,520	39.0	1,968,437	34.0	2,322,340	24.0	2,100,000	15.0
Office	---	---	730,904	13.5	810,673	14.0	1,499,844	15.5	2,400,000	17.0
Technical	221,241	5.0	225,737	4.5	260,528	4.5	675,500	7.0	1,260,000	9.0
Trade and Industry	1,069,274	24.0	1,087,807	20.0	1,302,502	22.5	2,566,100	26.5	4,120,000	30.0

1/ 44% in farming and direct farm-related training, and 56% in occupations related to Agriculture.

2/ 40% in occupations related to Home Economics.

Source: U. S. Office of Education.

TOTAL STATE ENROLLMENTS IN TITLE III TECHNICAL EDUCATION PROGRAMS FOR 1963 AND 1965

	Total State Technical Education Enrollment	
State	1963	1965
Alabama	696	980
Alaska	0	102
Arizona	384	511
Arkansas	14	357
California	24,099	28,776
Colorado	505	795
Connecticut	2,384	2,527
Delaware	76	155
Florida	3,393	4,707
Georgia	1,070	-
Hawaii	92	106
Idaho	297	344
Illinois	1,214	1,714
Indiana	143	324
Iowa	615	975
Kansas	1,266	1,107
Kentucky	317	227
Louisiana	1,706	1,115
Maine	91	114
Maryland	1,301	2,130
Massachusetts	634	966
Michigan	5,101	2,780
Minnesota	719	506
Mississippi	517	793
Missouri	508	1,342
Montana	198	410
Nebraska	482	643
Nevada	1,006	946
New Hampshire	0	0
New Jersey	1,318	2,582
New Mexico	83	237
New York	20,824	7,077
North Carolina	1,615	381
North Dakota	510	610
Ohio	1,167	1,040
Oklahoma	2,179	2,944
Oregon	965	1,475
Pennsylvania	2,572	3,538
Rhode Island	31	68
South Carolina	423	1,467
South Dakota	12	80
Tennessee	779	734
Texas	2,154	9,266
Utah	856	924
Vermont	218	299
Virginia	763	1,131
Washington	1,780	2,612
West Virginia	194	500
Wisconsin	3,750	2,968
Wyoming	16	20
District of Columbia	173	18
Puerto Rico	209	284
Virgin Islands	-	15
American Samoa	-	-
Guam	-	-
Total	91,419	95,722

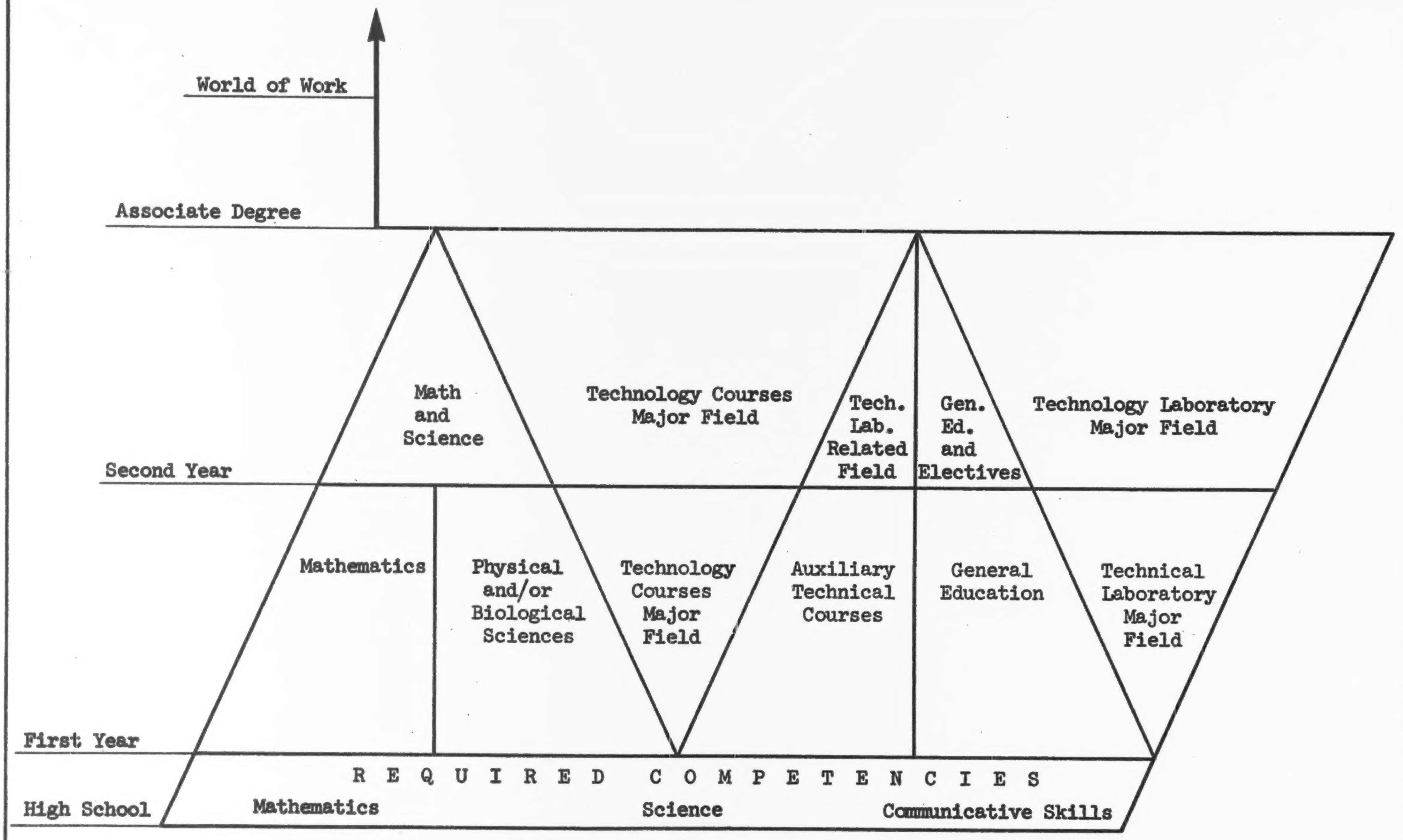
Source: U. S. Office of Education, Bulletin 80008-63, and 1965 Enrollment Title III Programs by State from U. S. Office of Education. Data were taken from state reports, subject to verification.

NUMBER OF INSTITUTIONS OFFERING TECHNICAL TRAINING PROGRAMS, BY STATE, BY TYPE

State	College or University	Community College	Technical Institute	Area Vocational School	High School	Total
Alabama	1	-	3	9	4	17
Alaska	-	-	-	-	-	-
Arizona	2	3	-	-	2	7
Arkansas	1	1	-	2	4	8
California	-	68	4	13	10	95
Colorado	3	6	-	2	1	12
Connecticut	-	1	5	11	-	17
Delaware	-	-	-	2	1	3
Florida	1	23	5	7	7	43
Georgia	3	2	1	22	-	28
Hawaii	1	-	2	-	-	3
Idaho	1	3	-	-	1	5
Illinois	3	18	9	-	7	37
Indiana	7	-	3	4	3	17
Iowa	1	8	-	6	2	17
Kansas	4	4	-	2	3	13
Kentucky	2	-	1	10	-	13
Louisiana	-	-	1	16	-	17
Maine	1	-	1	-	-	2
Maryland	-	7	1	2	3	13
Massachusetts	1	4	4	15	-	24
Michigan	6	15	4	1	8	34
Minnesota	-	2	-	16	-	18
Mississippi	-	11	-	-	3	14
Missouri	3	3	2	7	9	24
Montana	1	-	-	1	2	4
Nebraska	-	-	-	1	2	3
Nevada	1	-	-	2	3	6
New Hampshire	-	1	2	1	1	5
New Jersey	1	1	8	14	-	24
New Mexico	4	-	-	-	3	7
New York	-	22	5	3	21	51
North Carolina	1	5	11	5	-	22
North Dakota	1	-	-	-	-	1
Ohio	6	2	14	-	6	28
Oklahoma	5	8	-	-	1	14
Oregon	-	10	3	-	-	13
Pennsylvania	17	6	9	6	14	52
Rhode Island	-	1	2	1	-	4
South Carolina	-	-	-	6	2	8
South Dakota	1	1	-	-	1	3
Tennessee	-	-	2	1	10	13
Texas	6	28	-	-	5	39
Utah	6	-	-	2	-	8
Vermont	-	-	1	1	3	5
Virginia	1	1	2	2	3	9
Washington	-	14	-	6	-	20
West Virginia	3	-	-	1	6	10
Wisconsin	1	-	4	20	-	25
Wyoming	-	1	-	-	-	1
District of Columbia	-	-	1	-	1	2
Puerto Rico	1	-	1	-	-	2
Total	97	280	111	220	152	860

Source: Technical Education Yearbook 1965-66. Prakken Publications, Inc., Ann Arbor, Michigan, 1965.

DISTRIBUTION OF SUBJECT MATTER BY YEAR FOR A TWO-YEAR POST-HIGH SCHOOL TECHNICAL EDUCATION CURRICULUM


World of Work
Associate Degree
Math
and
Science
Technology Courses
Major Field
Tech.
Lab.
Related
Field
Gen.
Ed.
and
Electives
Technology Laboratory
Major Field
Second Year
Mathematics
Physical
and/or
Biological
Sciences
Technology
Courses
Major
Field
Auxiliary
Technical
Courses
General
Education
Technical
Laboratory
Major
Field
First Year
REQUIRED COMPETENCIES
High School
Mathematics
Science
Communicative Skills

Source: Ivan E. Valentine

FACILITY NEEDS TO ACCOMMODATE PROJECTED ENROLLMENTS
VOCATIONAL AND TECHNICAL EDUCATION

Year	Enrollment	Enrollment Increased Over Previous Year	New Work Stations Needed 1/	Estimated Cost 2/
1964	4,566,393	---	---	---
1965	5,430,611	864,218	288,073	$ 532,935,050
1966	5,789,520	358,909	119,636	221,326,600
1967	6,368,472	578,952	192,984	357,020,400
1968	7,323,742	955,270	318,423	589,082,550
1969	8,205,828	882,086	294,029	543,953,650
1970	9,676,415	1,470,587	490,196	906,862,600
1975	14,000,000	4,323,585	1,441,195	2,666,210,750
Totals	---	9,433,607	3,144,536	$ 5,817,391,000

1/ Work stations needed are calculated on the basis of each station serving three different students in classes operated--one in the morning, one in the afternoon, and one in the evening.

2/ Estimated costs for facilities are calculated by multiplying the number of new work stations needed by $1,850. Justification for the cost of $1,850 per student-work station is indicated as follows:

> A sampling of 20 contracts for school construction accomplished in 1965 in several states reveals a median cost of $1,890 per pupil. Cost data are based on 1965 contract data published in the Engineering News Record. Costs per pupil ranged from a state average of $882 in Texas, to $4,300 in Massachusetts. Average costs per square foot ranged from $11 in Kansas to $25 in New York City and Hawaii. The norm was a little better than $20.
>
> Previous projections when correlated with states' reported construction indicated average costs of $1,850 per pupil or per work station, and $20 per square foot. These costs were derived from an estimated total of $85 + million for constructing 1,978 classrooms, shops, and laboratories.

Source: U. S. Office of Education.

OTHER CENTER PUBLICATIONS

"Guidelines for State Supervisors in Office Occupations Education." 1965 Business Clinic

A Report of a National Seminar on Agriculture Education, "Program Development and Research.

"Guidance in Vocational Education." - Guidelines for Research and Practice.

"Research Planning in Business and Office Education."

"Evaluation and Program Planning in Agricultural Education."

"A Report of a National Seminar on Health Occupations Education Centers."

"A Report of a National Seminar on Cooperative Education."

A Report of "A National Leadership Seminar on Home Economics Education."

"Systems Under Development for Vocational Guidance." - A Report of a Research Exchange Conference.

"Guidelines in Cooperative Education."

"A Survey of Vocational Education Programs for Students with Special Needs."